



## SEQUENCE LISTING

<110> Myers, Lisa E.  
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<150> 08/613,009

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<150> 08/778,570

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<212> DNA

<213> *Moraxella catarrhalis*

<400> 6

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&lt;210&gt; 7

&lt;211&gt; 3435

&lt;212&gt; DNA

&lt;213&gt; Moraxella catarrhalis

&lt;400&gt; 7

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&lt;211&gt; 2127

&lt;212&gt; DNA

&lt;213&gt; Moraxella catarrhalis

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<211> 1074

<212> PRT

<213> Moraxella catarrhalis

<400> 9

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Tyr	Ala	Met	Gln	Asp	Lys	Thr	Val	Pro	Ala	Tyr	Leu	Thr	Val	His	Asp
355						360			365						
Ile	Glu	Lys	Ser	Arg	Leu	Ser	Asn	His	Ala	Gln	Ala	Asn	Gly	Tyr	Tyr
370			375			380									
Gln	Gly	Asn	Asn	Leu	Gly	Glu	Arg	Ile	Arg	Asp	Thr	Ile	Gly	Pro	Asp
385			390			395						400			
Ser	Gly	Tyr	Gly	Ile	Asn	Tyr	Ala	His	Gly	Val	Phe	Tyr	Asp	Glu	Lys
			405			410						415			
His	Gln	Lys	Asp	Arg	Leu	Gly	Leu	Glu	Tyr	Val	Tyr	Asp	Ser	Lys	Gly
			420			425						430			
Glu	Asn	Lys	Trp	Phe	Asp	Asp	Val	Arg	Val	Ser	Tyr	Asp	Lys	Gln	Asp
435			440			445									
Ile	Thr	Leu	Arg	Ser	Gln	Leu	Thr	Asn	Thr	His	Cys	Ser	Thr	Tyr	Pro
450			455			460									
His	Ile	Asp	Lys	Asn	Cys	Thr	Pro	Asp	Val	Asn	Lys	Pro	Phe	Ser	Val
465			470			475						480			
Lys	Glu	Val	Asp	Asn	Asn	Ala	Tyr	Lys	Glu	Gln	His	Asn	Leu	Ile	Lys
			485			490						495			
Ala	Val	Phe	Asn	Lys	Lys	Met	Ala	Leu	Gly	Ser	Thr	His	His	His	Ile
			500			505						510			

Asn	Leu	Gln	Val	Gly	Tyr	Asp	Lys	Phe	Asn	Ser	Ser	Leu	Ser	Arg	Glu
515						520						525			
Asp	Tyr	Arg	Leu	Ala	Thr	His	Gln	Ser	Tyr	Glu	Lys	Leu	Asp	Tyr	Thr
530						535						540			
Pro	Pro	Ser	Asn	Pro	Leu	Pro	Asp	Lys	Phe	Lys	Pro	Ile	Leu	Gly	Ser
545				550						555				560	
Asn	Asn	Lys	Pro	Ile	Cys	Leu	Asp	Ala	Tyr	Gly	Tyr	Gly	His	Asp	His
				565				570						575	
Pro	Gln	Ala	Cys	Asn	Ala	Lys	Asn	Ser	Thr	Tyr	Gln	Asn	Phe	Ala	Ile
		580						585				590			
Lys	Lys	Gly	Ile	Glu	Gln	Tyr	Asn	Gln	Lys	Thr	Asn	Thr	Asp	Lys	Ile
		595				600						605			
Asp	Tyr	Gln	Ala	Ile	Ile	Asp	Gln	Tyr	Asp	Lys	Gln	Asn	Pro	Asn	Ser
610						615						620			
Thr	Leu	Lys	Pro	Phe	Glu	Lys	Ile	Lys	Gln	Ser	Leu	Gly	Gln	Glu	Lys
625				630						635				640	
Tyr	Asn	Lys	Ile	Asp	Glu	Leu	Gly	Phe	Lys	Ala	Tyr	Lys	Asp	Leu	Arg
				645				650						655	
Asn	Glu	Trp	Ala	Gly	Trp	Thr	Asn	Asp	Asn	Ser	Gln	Gln	Asn	Ala	Asn
		660						665				670			
Lys	Gly	Thr	Asp	Asn	Ile	Tyr	Gln	Pro	Asn	Gln	Ala	Thr	Val	Val	Lys
		675				680						685			
Asp	Asp	Lys	Cys	Lys	Tyr	Ser	Glu	Thr	Asn	Ser	Tyr	Ala	Asp	Cys	Ser
690						695						700			
Thr	Thr	Ala	His	Ile	Ser	Gly	Asp	Asn	Tyr	Phe	Ile	Ala	Leu	Lys	Asp
705				710						715				720	
Asn	Met	Thr	Ile	Asn	Lys	Tyr	Val	Asp	Leu	Gly	Leu	Gly	Ala	Arg	Tyr
				725				730						735	
Asp	Arg	Ile	Lys	His	Lys	Ser	Asp	Val	Pro	Leu	Val	Asp	Asn	Ser	Ala
		740						745				750			
Ser	Asn	Gln	Leu	Ser	Trp	Asn	Phe	Gly	Val	Val	Val	Lys	Pro	Thr	Asn
755						760						765			
Trp	Leu	Asp	Ile	Ala	Tyr	Arg	Ser	Ser	Gln	Gly	Phe	Arg	Met	Pro	Ser
770						775						780			
Phe	Ser	Glu	Met	Tyr	Gly	Glu	Arg	Phe	Gly	Val	Thr	Ile	Gly	Lys	Gly
785				790						795				800	
Thr	Gln	His	Gly	Cys	Lys	Gly	Leu	Tyr	Tyr	Ile	Cys	Gln	Gln	Thr	Val
				805				810						815	

His Gln Thr Lys Leu Lys Pro Glu Lys Ser Phe Asn Gln Glu Ile Gly  
 820 825 830  
 Ala Thr Leu His Asn His Leu Gly Ser Leu Glu Val Ser Tyr Phe Lys  
 835 840 845  
 Asn Arg Tyr Thr Asp Leu Ile Val Gly Lys Ser Glu Glu Ile Arg Thr  
 850 855 860  
 Leu Thr Gln Gly Asp Asn Ala Gly Lys Gln Arg Gly Lys Gly Asp Leu  
 865 870 875 880  
 Gly Phe His Asn Gly Gln Asp Ala Asp Leu Thr Gly Ile Asn Ile Leu  
 885 890 895  
 Gly Arg Leu Asp Leu Asn Ala Val Asn Ser Arg Leu Pro Tyr Gly Leu  
 900 905 910  
 Tyr Ser Thr Leu Ala Tyr Asn Lys Val Asp Val Lys Gly Lys Thr Leu  
 915 920 925  
 Asn Pro Thr Leu Ala Gly Thr Asn Ile Leu Phe Asp Ala Ile Gln Pro  
 930 935 940  
 Ser Arg Tyr Val Val Gly Leu Gly Tyr Asp Ala Pro Ser Gln Lys Trp  
 945 950 955 960  
 Gly Ala Asn Ala Ile Phe Thr His Ser Asp Ala Lys Asn Pro Ser Glu  
 965 970 975  
 Leu Leu Ala Asp Lys Asn Leu Gly Asn Gly Asn Ile Gln Thr Lys Gln  
 980 985 990  
 Ala Thr Lys Ala Lys Ser Thr Pro Trp Gln Thr Leu Asp Leu Ser Gly  
 995 1000 1005  
 Tyr Val Asn Ile Lys Asp Asn Phe Thr Leu Arg Ala Gly Val Tyr Asn  
 1010 1015 1020  
 Val Phe Asn Thr Tyr Tyr Thr Thr Trp Glu Ala Leu Arg Gln Thr Ala  
 1025 1030 1035 1040  
 Glu Gly Ala Val Asn Gln His Thr Gly Leu Ser Gln Asp Lys His Tyr  
 1045 1050 1055  
 Gly Arg Tyr Ala Ala Pro Gly Arg Asn Tyr Gln Leu Ala Leu Glu Met  
 1060 1065 1070  
 Lys Phe

&lt;210&gt; 10

&lt;211&gt; 1053

&lt;212&gt; PRT

&lt;213&gt; Moraxella catarrhalis

&lt;400&gt; 10

Leu	Ser	Leu	Gly	Leu	Leu	Asn	Ile	Thr	Gln	Val	Ala	Leu	Ala	Asn	Thr	1	5	10	15
Thr	Ala	Asp	Lys	Ala	Glu	Ala	Thr	Asp	Lys	Thr	Asn	Leu	Val	Val	Val	20	25	30	
Leu	Asp	Glu	Thr	Val	Val	Thr	Ala	Lys	Lys	Asn	Ala	Arg	Lys	Ala	Asn	35	40	45	
Glu	Val	Thr	Gly	Leu	Gly	Lys	Val	Val	Lys	Thr	Ala	Glu	Thr	Ile	Asn	50	55	60	
Lys	Glu	Gln	Val	Leu	Asn	Ile	Arg	Asp	Leu	Thr	Arg	Tyr	Asp	Pro	Gly	65	70	75	80
Ile	Ala	Val	Val	Glu	Gln	Gly	Arg	Gly	Ala	Ser	Ser	Gly	Tyr	Ser	Ile	85	90	95	
Arg	Gly	Met	Asp	Lys	Asn	Arg	Val	Ala	Val	Leu	Val	Asp	Gly	Ile	Asn	100	105	110	
Gln	Ala	Gln	His	Tyr	Ala	Leu	Gln	Gly	Pro	Val	Ala	Gly	Lys	Asn	Tyr	115	120	125	
Ala	Ala	Gly	Gly	Ala	Ile	Asn	Glu	Ile	Glu	Tyr	Glu	Asn	Val	Arg	Ser	130	135	140	
Val	Glu	Ile	Ser	Lys	Gly	Ala	Asn	Ser	Ser	Glu	Tyr	Gly	Ser	Gly	Ala	145	150	155	160
Leu	Ser	Gly	Ser	Val	Ala	Phe	Val	Thr	Lys	Thr	Ala	Asp	Asp	Ile	Ile	165	170	175	
Lys	Asp	Gly	Lys	Asp	Trp	Gly	Val	Gln	Thr	Lys	Thr	Ala	Tyr	Ala	Ser	180	185	190	
Lys	Asn	Asn	Ala	Trp	Val	Asn	Ser	Val	Ala	Ala	Ala	Gly	Lys	Ala	Gly	195	200	205	
Ser	Phe	Ser	Gly	Leu	Ile	Ile	Tyr	Thr	Asp	Arg	Arg	Gly	Gln	Glu	Tyr	210	215	220	
Lys	Ala	His	Asp	Asp	Ala	Tyr	Gln	Gly	Ser	Gln	Ser	Phe	Asp	Arg	Ala	225	230	235	240
Val	Ala	Thr	Thr	Asp	Pro	Asn	Asn	Arg	Thr	Phe	Leu	Ile	Ala	Asn	Glu	245	250	255	
Cys	Ala	Asn	Gly	Asn	Tyr	Glu	Ala	Cys	Ala	Ala	Gly	Gly	Gln	Thr	Lys	260	265	270	
Leu	Gln	Ala	Lys	Pro	Thr	Asn	Val	Arg	Asp	Lys	Val	Asn	Val	Lys	Asp	275	280	285	
Tyr	Thr	Gly	Pro	Asn	Arg	Leu	Ile	Pro	Asn	Pro	Leu	Thr	Gln	Asp	Ser	290	295	300	

Lys	Ser	Leu	Leu	Leu	Arg	Pro	Gly	Tyr	Gln	Leu	Asn	Asp	Lys	His	Tyr	305	310	315	320
Val	Gly	Gly	Val	Tyr	Glu	Ile	Thr	Lys	Gln	Asn	Tyr	Ala	Met	Gln	Asp	325	330	335	
Lys	Thr	Val	Pro	Ala	Tyr	Leu	Thr	Val	His	Asp	Ile	Glu	Lys	Ser	Arg	340	345	350	
Leu	Ser	Asn	His	Ala	Gln	Ala	Asn	Gly	Tyr	Tyr	Gln	Gly	Asn	Asn	Leu	355	360	365	
Gly	Glu	Arg	Ile	Arg	Asp	Thr	Ile	Gly	Pro	Asp	Ser	Gly	Tyr	Gly	Ile	370	375	380	
Asn	Tyr	Ala	His	Gly	Val	Phe	Tyr	Asp	Glu	Lys	His	Gln	Lys	Asp	Arg	385	390	395	400
Leu	Gly	Leu	Glu	Tyr	Val	Tyr	Asp	Ser	Lys	Gly	Glu	Asn	Lys	Trp	Phe	405	410	415	
Asp	Asp	Val	Arg	Val	Ser	Tyr	Asp	Lys	Gln	Asp	Ile	Thr	Leu	Arg	Ser	420	425	430	
Gln	Leu	Thr	Asn	Thr	His	Cys	Ser	Thr	Tyr	Pro	His	Ile	Asp	Lys	Asn	435	440	445	
Cys	Thr	Pro	Asp	Val	Asn	Lys	Pro	Phe	Ser	Val	Lys	Glu	Val	Asp	Asn	450	455	460	
Asn	Ala	Tyr	Lys	Glu	Gln	His	Asn	Leu	Ile	Lys	Ala	Val	Phe	Asn	Lys	465	470	475	480
Lys	Met	Ala	Leu	Gly	Ser	Thr	His	His	His	Ile	Asn	Leu	Gln	Val	Gly	485	490	495	
Tyr	Asp	Lys	Phe	Asn	Ser	Ser	Leu	Ser	Arg	Glu	Asp	Tyr	Arg	Leu	Ala	500	505	510	
Thr	His	Gln	Ser	Tyr	Glu	Lys	Leu	Asp	Tyr	Thr	Pro	Pro	Ser	Asn	Pro	515	520	525	
Leu	Pro	Asp	Lys	Phe	Lys	Pro	Ile	Leu	Gly	Ser	Asn	Asn	Lys	Pro	Ile	530	535	540	
Cys	Leu	Asp	Ala	Tyr	Gly	Tyr	Gly	His	Asp	His	Pro	Gln	Ala	Cys	Asn	545	550	555	560
Ala	Lys	Asn	Ser	Thr	Tyr	Gln	Asn	Phe	Ala	Ile	Lys	Lys	Gly	Ile	Glu	565	570	575	
Gln	Tyr	Asn	Gln	Lys	Thr	Asn	Thr	Asp	Lys	Ile	Asp	Tyr	Gln	Ala	Ile	580	585	590	
Ile	Asp	Gln	Tyr	Asp	Lys	Gln	Asn	Pro	Asn	Ser	Thr	Leu	Lys	Pro	Phe	595	600	605	
Glu	Lys	Ile	Lys	Gln	Ser	Leu	Gly	Gln	Glu	Lys	Tyr	Asn	Lys	Ile	Asp	610	615	620	

Glu	Leu	Gly	Phe	Lys	Ala	Tyr	Lys	Asp	Leu	Arg	Asn	Glu	Trp	Ala	Gly	
625					630					635					640	
Trp	Thr	Asn	Asp	Asn	Ser	Gln	Gln	Asn	Ala	Asn	Lys	Gly	Thr	Asp	Asn	
				645					650					655		
Ile	Tyr	Gln	Pro	Asn	Gln	Ala	Thr	Val	Val	Lys	Asp	Asp	Lys	Cys	Lys	
			660					665					670			
Tyr	Ser	Glu	Thr	Asn	Ser	Tyr	Ala	Asp	Cys	Ser	Thr	Thr	Ala	His	Ile	
		675					680					685				
Ser	Gly	Asp	Asn	Tyr	Phe	Ile	Ala	Leu	Lys	Asp	Asn	Met	Thr	Ile	Asn	
	690					695					700					
Lys	Tyr	Val	Asp	Leu	Gly	Leu	Gly	Ala	Arg	Tyr	Asp	Arg	Ile	Lys	His	
705					710					715					720	
Lys	Ser	Asp	Val	Pro	Leu	Val	Asp	Asn	Ser	Ala	Ser	Asn	Gln	Leu	Ser	
				725					730					735		
Trp	Asn	Phe	Gly	Val	Val	Val	Lys	Pro	Thr	Asn	Trp	Leu	Asp	Ile	Ala	
			740					745					750			
Tyr	Arg	Ser	Ser	Gln	Gly	Phe	Arg	Met	Pro	Ser	Phe	Ser	Glu	Met	Tyr	
		755					760					765				
Gly	Glu	Arg	Phe	Gly	Val	Thr	Ile	Gly	Lys	Gly	Thr	Gln	His	Gly	Cys	
	770					775					780					
Lys	Gly	Leu	Tyr	Tyr	Ile	Cys	Gln	Gln	Thr	Val	His	Gln	Thr	Lys	Leu	
785					790					795					800	
Lys	Pro	Glu	Lys	Ser	Phe	Asn	Gln	Glu	Ile	Gly	Ala	Thr	Leu	His	Asn	
				805					810					815		
His	Leu	Gly	Ser	Leu	Glu	Val	Ser	Tyr	Phe	Lys	Asn	Arg	Tyr	Thr	Asp	
			820					825					830			
Leu	Ile	Val	Gly	Lys	Ser	Glu	Glu	Ile	Arg	Thr	Leu	Thr	Gln	Gly	Asp	
		835					840					845				
Asn	Ala	Gly	Lys	Gln	Arg	Gly	Lys	Gly	Asp	Leu	Gly	Phe	His	Asn	Gly	
	850					855					860					
Gln	Asp	Ala	Asp	Leu	Thr	Gly	Ile	Asn	Ile	Leu	Gly	Arg	Leu	Asp	Leu	
865					870					875					880	
Asn	Ala	Val	Asn	Ser	Arg	Leu	Pro	Tyr	Gly	Leu	Tyr	Ser	Thr	Leu	Ala	
				885					890					895		
Tyr	Asn	Lys	Val	Asp	Val	Lys	Gly	Lys	Thr	Leu	Asn	Pro	Thr	Leu	Ala	
			900					905					910			
Gly	Thr	Asn	Ile	Leu	Phe	Asp	Ala	Ile	Gln	Pro	Ser	Arg	Tyr	Val	Val	
		915					920					925				

Gly Leu Gly Tyr Asp Ala Pro Ser Gln Lys Trp Gly Ala Asn Ala Ile  
 930 935 940

Phe Thr His Ser Asp Ala Lys Asn Pro Ser Glu Leu Leu Ala Asp Lys  
 945 950 955 960

Asn Leu Gly Asn Gly Asn Ile Gln Thr Lys Gln Ala Thr Lys Ala Lys  
 965 970 975

Ser Thr Pro Trp Gln Thr Leu Asp Leu Ser Gly Tyr Val Asn Ile Lys  
 980 985 990

Asp Asn Phe Thr Leu Arg Ala Gly Val Tyr Asn Val Phe Asn Thr Tyr  
 995 1000 1005

Tyr Thr Thr Trp Glu Ala Leu Arg Gln Thr Ala Glu Gly Ala Val Asn  
 1010 1015 1020

Gln His Thr Gly Leu Ser Gln Asp Lys His Tyr Gly Arg Tyr Ala Ala  
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Pro Gly Arg Asn Tyr Gln Leu Ala Leu Glu Met Lys Phe  
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<211> 702

<212> PRT

<213> Moraxella catarrhalis

<400> 11

Met Lys His Ile Pro Leu Thr Thr Leu Cys Val Ala Ile Ser Ala Val  
 1 5 10 15

Leu Leu Thr Ala Cys Gly Gly Ser Gly Gly Ser Asn Pro Pro Ala Pro  
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Thr Pro Ile Pro Asn Ala Ser Gly Ser Gly Asn Thr Gly Asn Thr Gly  
 35 40 45

Asn Ala Gly Gly Thr Asp Asn Thr Ala Asn Ala Gly Asn Thr Gly Gly  
 50 55 60

Thr Asn Ser Gly Thr Gly Ser Ala Asn Thr Pro Glu Pro Lys Tyr Gln  
 65 70 75 80

Asp Val Pro Thr Glu Lys Asn Glu Lys Asp Lys Val Ser Ser Ile Gln  
 85 90 95

Glu Pro Ala Met Gly Tyr Gly Met Ala Leu Ser Lys Ile Asn Leu His  
 100 105 110

Asn Arg Gln Asp Thr Pro Leu Asp Glu Lys Asn Ile Ile Thr Leu Asp  
 115 120 125

Gly Lys Lys Gln Val Ala Glu Gly Lys Lys Ser Pro Leu Pro Phe Ser  
 130 135 140



Leu Asp Val Glu Asn Lys Leu Leu Asp Gly Tyr Ile Ala Lys Met Asn  
 145 150 155 160  
 Val Ala Asp Lys Asn Ala Ile Gly Asp Arg Ile Lys Lys Gly Asn Lys  
 165 170 175  
 Glu Ile Ser Asp Glu Glu Leu Ala Lys Gln Ile Lys Glu Ala Val Arg  
 180 185 190  
 Lys Ser His Glu Phe Gln Gln Val Leu Ser Ser Leu Glu Asn Lys Ile  
 195 200 205  
 Phe His Ser Asn Asp Gly Thr Thr Lys Ala Thr Thr Arg Asp Leu Lys  
 210 215 220  
 Tyr Val Asp Tyr Gly Tyr Tyr Leu Ala Asn Asp Gly Asn Tyr Leu Thr  
 225 230 235 240  
 Val Lys Thr Asp Lys Leu Trp Asn Leu Gly Pro Val Gly Gly Val Phe  
 245 250 255  
 Tyr Asn Gly Thr Thr Thr Ala Lys Glu Leu Pro Thr Gln Asp Ala Val  
 260 265 270  
 Lys Tyr Lys Gly His Trp Asp Phe Met Thr Asp Val Ala Asn Arg Arg  
 275 280 285  
 Asn Arg Phe Ser Glu Val Lys Glu Asn Ser Gln Ala Gly Trp Tyr Tyr  
 290 295 300  
 Gly Ala Ser Ser Lys Asp Glu Tyr Asn Arg Leu Leu Thr Lys Glu Asp  
 305 310 315 320  
 Ser Ala Pro Asp Gly His Ser Gly Glu Tyr Gly His Ser Ser Glu Phe  
 325 330 335  
 Thr Val Asn Phe Lys Glu Lys Lys Leu Thr Gly Lys Leu Phe Ser Asn  
 340 345 350  
 Leu Gln Asp Arg His Lys Gly Asn Val Thr Lys Thr Glu Arg Tyr Asp  
 355 360 365  
 Ile Asp Ala Asn Ile His Gly Asn Arg Phe Arg Gly Ser Ala Thr Ala  
 370 375 380  
 Ser Asn Lys Asn Asp Thr Ser Lys His Pro Phe Thr Ser Asp Ala Asn  
 385 390 395 400  
 Asn Arg Leu Glu Gly Gly Phe Tyr Gly Pro Lys Gly Glu Glu Leu Ala  
 405 410 415  
 Gly Lys Phe Leu Thr Asn Asp Asn Lys Leu Phe Gly Val Phe Gly Ala  
 420 425 430  
 Lys Arg Glu Ser Lys Ala Glu Glu Lys Thr Glu Ala Ile Leu Asp Ala  
 435 440 445

Tyr Ala Leu Gly Thr Phe Asn Thr Ser Asn Ala Thr Thr Phe Thr Pro  
 450 455 460  
 Phe Thr Glu Lys Gln Leu Asp Asn Phe Gly Asn Ala Lys Lys Leu Val  
 465 470 475 480  
 Leu Gly Ser Thr Val Ile Asp Leu Val Pro Thr Asp Ala Thr Lys Asn  
 485 490 495  
 Glu Phe Thr Lys Asp Lys Pro Glu Ser Ala Thr Asn Glu Ala Gly Glu  
 500 505 510  
 Thr Leu Met Val Asn Asp Glu Val Ser Val Lys Thr Tyr Gly Lys Asn  
 515 520 525  
 Phe Glu Tyr Leu Lys Phe Gly Glu Leu Ser Ile Gly Gly Ser His Ser  
 530 535 540  
 Val Phe Leu Gln Gly Glu Arg Thr Ala Thr Thr Gly Glu Lys Ala Val  
 545 550 555 560  
 Pro Thr Thr Gly Thr Ala Lys Tyr Leu Gly Asn Trp Val Gly Tyr Ile  
 565 570 575  
 Thr Gly Lys Asp Thr Gly Thr Gly Thr Gly Lys Ser Phe Thr Asp Ala  
 580 585 590  
 Gln Asp Val Ala Asp Phe Asp Ile Asp Phe Gly Asn Lys Ser Val Ser  
 595 600 605  
 Gly Lys Leu Ile Thr Lys Gly Arg Gln Asp Pro Val Phe Ser Ile Thr  
 610 615 620  
 Gly Gln Ile Ala Gly Asn Gly Trp Thr Gly Thr Ala Ser Thr Thr Lys  
 625 630 635 640  
 Ala Asp Ala Gly Gly Tyr Lys Ile Asp Ser Ser Ser Thr Gly Lys Ser  
 645 650 655  
 Ile Ala Ile Lys Asp Ala Asn Val Thr Gly Gly Phe Tyr Gly Pro Asn  
 660 665 670  
 Ala Asn Glu Met Gly Gly Ser Phe Thr His Asn Ala Asp Asp Ser Lys  
 675 680 685  
 Ala Ser Val Val Phe Gly Thr Lys Arg Gln Gln Glu Val Lys  
 690 695 700

<210> 12  
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 <212> PRT  
 <213> Moraxella catarrhalis

<400> 12  
 Cys Gly Gly Ser Gly Gly Ser Asn Pro Pro Ala Pro Thr Pro Ile Pro  
 1 5 10 15

Asn	Ala	Ser	Gly	Ser	Gly	Asn	Thr	Gly	Asn	Thr	Gly	Asn	Ala	Gly	Gly		
			20					25					30				
Thr	Asp	Asn	Thr	Ala	Asn	Ala	Gly	Asn	Thr	Gly	Gly	Thr	Asn	Ser	Gly		
		35					40					45					
Thr	Gly	Ser	Ala	Asn	Thr	Pro	Glu	Pro	Lys	Tyr	Gln	Asp	Val	Pro	Thr		
	50					55					60						
Glu	Lys	Asn	Glu	Lys	Asp	Lys	Val	Ser	Ser	Ile	Gln	Glu	Pro	Ala	Met		
65					70					75					80		
Gly	Tyr	Gly	Met	Ala	Leu	Ser	Lys	Ile	Asn	Leu	His	Asn	Arg	Gln	Asp		
				85					90					95			
Thr	Pro	Leu	Asp	Glu	Lys	Asn	Ile	Ile	Thr	Leu	Asp	Gly	Lys	Lys	Gln		
			100					105					110				
Val	Ala	Glu	Gly	Lys	Lys	Ser	Pro	Leu	Pro	Phe	Ser	Leu	Asp	Val	Glu		
		115					120					125					
Asn	Lys	Leu	Leu	Asp	Gly	Tyr	Ile	Ala	Lys	Met	Asn	Val	Ala	Asp	Lys		
	130					135					140						
Asn	Ala	Ile	Gly	Asp	Arg	Ile	Lys	Lys	Gly	Asn	Lys	Glu	Ile	Ser	Asp		
145					150					155					160		
Glu	Glu	Leu	Ala	Lys	Gln	Ile	Lys	Glu	Ala	Val	Arg	Lys	Ser	His	Glu		
				165				170						175			
Phe	Gln	Gln	Val	Leu	Ser	Ser	Leu	Glu	Asn	Lys	Ile	Phe	His	Ser	Asn		
			180					185					190				
Asp	Gly	Thr	Thr	Lys	Ala	Thr	Thr	Arg	Asp	Leu	Lys	Tyr	Val	Asp	Tyr		
		195					200					205					
Gly	Tyr	Tyr	Leu	Ala	Asn	Asp	Gly	Asn	Tyr	Leu	Thr	Val	Lys	Thr	Asp		
	210				215						220						
Lys	Leu	Trp	Asn	Leu	Gly	Pro	Val	Gly	Gly	Val	Phe	Tyr	Asn	Gly	Thr		
225					230					235					240		
Thr	Thr	Ala	Lys	Glu	Leu	Pro	Thr	Gln	Asp	Ala	Val	Lys	Tyr	Lys	Gly		
			245					250						255			
His	Trp	Asp	Phe	Met	Thr	Asp	Val	Ala	Asn	Arg	Arg	Asn	Arg	Phe	Ser		
		260						265					270				
Glu	Val	Lys	Glu	Asn	Ser	Gln	Ala	Gly	Trp	Tyr	Tyr	Gly	Ala	Ser	Ser		
	275						280					285					
Lys	Asp	Glu	Tyr	Asn	Arg	Leu	Leu	Thr	Lys	Glu	Asp	Ser	Ala	Pro	Asp		
	290					295					300						
Gly	His	Ser	Gly	Glu	Tyr	Gly	His	Ser	Ser	Glu	Phe	Thr	Val	Asn	Phe		
305					310					315					320		
Lys	Glu	Lys	Lys	Leu	Thr	Gly	Lys	Leu	Phe	Ser	Asn	Leu	Gln	Asp	Arg		
				325					330					335			

His	Lys	Gly	Asn	Val	Thr	Lys	Thr	Glu	Arg	Tyr	Asp	Ile	Asp	Ala	Asn		
			340					345					350				
Ile	His	Gly	Asn	Arg	Phe	Arg	Gly	Ser	Ala	Thr	Ala	Ser	Asn	Lys	Asn		
		355					360					365					
Asp	Thr	Ser	Lys	His	Pro	Phe	Thr	Ser	Asp	Ala	Asn	Asn	Arg	Leu	Glu		
	370					375					380						
Gly	Gly	Phe	Tyr	Gly	Pro	Lys	Gly	Glu	Glu	Leu	Ala	Gly	Lys	Phe	Leu		
385					390					395					400		
Thr	Asn	Asp	Asn	Lys	Leu	Phe	Gly	Val	Phe	Gly	Ala	Lys	Arg	Glu	Ser		
				405					410					415			
Lys	Ala	Glu	Glu	Lys	Thr	Glu	Ala	Ile	Leu	Asp	Ala	Tyr	Ala	Leu	Gly		
			420					425						430			
Thr	Phe	Asn	Thr	Ser	Asn	Ala	Thr	Thr	Phe	Thr	Pro	Phe	Thr	Glu	Lys		
		435					440					445					
Gln	Leu	Asp	Asn	Phe	Gly	Asn	Ala	Lys	Lys	Leu	Val	Leu	Gly	Ser	Thr		
	450					455					460						
Val	Ile	Asp	Leu	Val	Pro	Thr	Asp	Ala	Thr	Lys	Asn	Glu	Phe	Thr	Lys		
465					470					475					480		
Asp	Lys	Pro	Glu	Ser	Ala	Thr	Asn	Glu	Ala	Gly	Glu	Thr	Leu	Met	Val		
				485					490					495			
Asn	Asp	Glu	Val	Ser	Val	Lys	Thr	Tyr	Gly	Lys	Asn	Phe	Glu	Tyr	Leu		
			500					505					510				
Lys	Phe	Gly	Glu	Leu	Ser	Ile	Gly	Gly	Ser	His	Ser	Val	Phe	Leu	Gln		
		515					520					525					
Gly	Glu	Arg	Thr	Ala	Thr	Thr	Gly	Glu	Lys	Ala	Val	Pro	Thr	Thr	Gly		
	530					535						540					
Thr	Ala	Lys	Tyr	Leu	Gly	Asn	Trp	Val	Gly	Tyr	Ile	Thr	Gly	Lys	Asp		
545					550					555					560		
Thr	Gly	Thr	Gly	Thr	Gly	Lys	Ser	Phe	Thr	Asp	Ala	Gln	Asp	Val	Ala		
				565					570					575			
Asp	Phe	Asp	Ile	Asp	Phe	Gly	Asn	Lys	Ser	Val	Ser	Gly	Lys	Leu	Ile		
			580					585					590				
Thr	Lys	Gly	Arg	Gln	Asp	Pro	Val	Phe	Ser	Ile	Thr	Gly	Gln	Ile	Ala		
		595					600					605					
Gly	Asn	Gly	Trp	Thr	Gly	Thr	Ala	Ser	Thr	Thr	Lys	Ala	Asp	Ala	Gly		
	610					615					620						
Gly	Tyr	Lys	Ile	Asp	Ser	Ser	Ser	Thr	Gly	Lys	Ser	Ile	Ala	Ile	Lys		
625					630					635					640		

Ala Ser Lys Asn Asn Ala Trp Val Asn Ser Val Ala Ala Ala Gly Lys  
210 215 220

Ala	Gly	Ser	Phe	Ser	Gly	Leu	Ile	Ile	Tyr	Thr	Asp	Arg	Arg	Gly	Gln	225	230	235	240
Glu	Tyr	Lys	Ala	His	Asp	Asp	Ala	Tyr	Gln	Gly	Ser	Gln	Ser	Phe	Asp	245	250	255	
Arg	Ala	Val	Ala	Thr	Thr	Asp	Pro	Asn	Asn	Pro	Lys	Phe	Leu	Ile	Ala	260	265	270	
Asn	Glu	Cys	Ala	Asn	Gly	Asn	Tyr	Glu	Ala	Cys	Ala	Ala	Gly	Gly	Gln	275	280	285	
Thr	Lys	Leu	Gln	Ala	Lys	Pro	Thr	Asn	Val	Arg	Asp	Lys	Val	Asn	Val	290	295	300	
Lys	Asp	Tyr	Thr	Gly	Pro	Asn	Arg	Leu	Ile	Pro	Asn	Pro	Leu	Thr	Gln	305	310	315	320
Asp	Ser	Lys	Ser	Leu	Leu	Leu	Arg	Pro	Gly	Tyr	Gln	Leu	Asn	Asp	Lys	325	330	335	
His	Tyr	Val	Gly	Gly	Val	Tyr	Glu	Ile	Thr	Lys	Gln	Asn	Tyr	Ala	Met	340	345	350	
Gln	Asp	Lys	Thr	Val	Pro	Ala	Tyr	Leu	Thr	Val	His	Asp	Ile	Glu	Lys	355	360	365	
Ser	Arg	Leu	Ser	Asn	His	Gly	Gln	Ala	Asn	Gly	Tyr	Tyr	Gln	Gly	Asn	370	375	380	
Asn	Leu	Gly	Glu	Arg	Ile	Arg	Asp	Ala	Ile	Gly	Ala	Asn	Ser	Gly	Tyr	385	390	395	400
Gly	Ile	Asn	Tyr	Ala	His	Gly	Val	Phe	Tyr	Asp	Glu	Lys	His	Gln	Lys	405	410	415	
Asp	Arg	Leu	Gly	Leu	Glu	Tyr	Val	Tyr	Asp	Ser	Lys	Gly	Glu	Asn	Lys	420	425	430	
Trp	Phe	Asp	Asp	Val	Arg	Val	Ser	Tyr	Asp	Lys	Gln	Asp	Ile	Thr	Leu	435	440	445	
Arg	Ser	Gln	Leu	Thr	Asn	Thr	His	Cys	Ser	Thr	Tyr	Pro	His	Ile	Asp	450	455	460	
Lys	Asn	Cys	Thr	Pro	Asp	Val	Asn	Lys	Pro	Phe	Ser	Val	Lys	Glu	Val	465	470	475	480
Asp	Asn	Asn	Ala	Tyr	Lys	Glu	Gln	His	Asn	Leu	Ile	Lys	Ala	Val	Phe	485	490	495	
Asn	Lys	Lys	Met	Ala	Leu	Gly	Asn	Thr	His	His	His	Ile	Asn	Leu	Gln	500	505	510	
Val	Gly	Tyr	Asp	Lys	Phe	Asn	Ser	Leu	Ser	Arg	Glu	Asp	Tyr	Arg		515	520	525	
Leu	Ala	Thr	His	Gln	Ser	Tyr	Gln	Lys	Leu	Asp	Tyr	Thr	Pro	Pro	Ser	530	535	540	

Asn	Pro	Leu	Pro	Asp	Lys	Phe	Lys	Pro	Ile	Leu	Gly	Ser	Asn	Asn	Arg	
545					550					555					560	
Pro	Ile	Cys	Leu	Asp	Ala	Tyr	Gly	Tyr	Gly	His	Asp	His	Pro	Gln	Ala	
				565					570					575		
Cys	Asn	Ala	Lys	Asn	Ser	Thr	Tyr	Gln	Asn	Phe	Ala	Ile	Lys	Lys	Gly	
			580					585					590			
Ile	Glu	Gln	Tyr	Asn	Gln	Thr	Asn	Thr	Asp	Lys	Ile	Asp	Tyr	Gln	Ala	
		595					600					605				
Val	Ile	Asp	Gln	Tyr	Asp	Lys	Gln	Asn	Pro	Asn	Ser	Thr	Leu	Lys	Pro	
	610					615					620					
Phe	Glu	Lys	Ile	Lys	Gln	Ser	Leu	Gly	Gln	Glu	Lys	Tyr	Asp	Glu	Ile	
625					630					635					640	
Asp	Arg	Leu	Gly	Phe	Asn	Ala	Tyr	Lys	Asp	Leu	Arg	Asn	Glu	Trp	Ala	
				645					650					655		
Gly	Trp	Thr	Asn	Asp	Asn	Ser	Gln	Gln	Asn	Ala	Asn	Lys	Gly	Thr	Asp	
			660					665					670			
Asn	Ile	Tyr	Gln	Pro	Asn	Gln	Ala	Thr	Val	Val	Lys	Asp	Asp	Lys	Cys	
	675					680						685				
Lys	Tyr	Ser	Glu	Thr	Asn	Ser	Tyr	Ala	Asp	Cys	Ser	Thr	Thr	Arg	His	
	690					695					700					
Ile	Ser	Gly	Asp	Asn	Tyr	Phe	Ile	Ala	Leu	Lys	Asp	Asn	Met	Thr	Ile	
705				710						715					720	
Asn	Lys	Tyr	Val	Asp	Leu	Gly	Leu	Gly	Ala	Arg	Tyr	Asp	Arg	Ile	Lys	
				725					730					735		
His	Lys	Ser	Asp	Val	Pro	Leu	Val	Asp	Asn	Ser	Ala	Ser	Asn	Gln	Leu	
			740					745					750			
Ser	Trp	Asn	Phe	Gly	Val	Val	Val	Lys	Pro	Thr	Asn	Trp	Leu	Asp	Ile	
		755					760					765				
Ala	Tyr	Arg	Ser	Ser	Gln	Gly	Phe	Arg	Met	Pro	Ser	Phe	Ser	Glu	Met	
	770					775					780					
Tyr	Gly	Glu	Arg	Phe	Gly	Val	Thr	Ile	Gly	Lys	Gly	Thr	Gln	His	Gly	
785					790					795					800	
Cys	Lys	Gly	Leu	Tyr	Tyr	Ile	Cys	Gln	Gln	Thr	Val	His	Gln	Thr	Lys	
			805					810					815			
Leu	Lys	Pro	Glu	Lys	Ser	Phe	Asn	Gln	Glu	Ile	Gly	Ala	Thr	Leu	His	
		820						825					830			
Asn	His	Leu	Gly	Ser	Leu	Glu	Val	Ser	Tyr	Phe	Lys	Asn	Arg	Tyr	Thr	
	835						840					845				

Asp Leu Ile Val Gly Lys Ser Glu Glu Ile Arg Thr Leu Thr Gln Gly  
850 855 860

Asp Asn Ala Gly Lys Gln Arg Gly Lys Gly Asp Leu Gly Phe His Asn  
865 870 875 880

Gly Gln Asp Ala Asp Leu Thr Gly Ile Asn Ile Leu Gly Arg Leu Asp  
885 890 895

Leu Asn Ala Val Asn Ser Arg Leu Pro Tyr Gly Leu Tyr Ser Thr Leu  
900 905 910

Ala Tyr Asn Lys Val Asp Val Lys Gly Lys Thr Leu Asn Pro Thr Leu  
915 920 925

Ala Gly Thr Asn Ile Leu Phe Asp Ala Ile Gln Pro Ser Arg Tyr Val  
930 935 940

Val Gly Leu Gly Tyr Asp Ala Pro Ser Gln Lys Trp Gly Ala Asn Ala  
945 950 955 960

Ile Phe Thr His Ser Asp Ala Lys Asn Pro Ser Glu Leu Leu Ala Asp  
965 970 975

Lys Asn Leu Gly Asn Gly Asn Asn Gln Thr Lys Gln Ala Thr Lys Ala  
980 985 990

Lys Ser Thr Pro Trp Gln Thr Leu Asp Leu Ser Gly Tyr Val Asn Ile  
995 1000 1005

Lys Asp Asn Phe Thr Leu Arg Ala Gly Val Tyr Asn Val Phe Asn Thr  
1010 1015 1020

Tyr Tyr Thr Thr Trp Glu Ala Leu Arg Gln Thr Ala Glu Gly Ala Val  
1025 1030 1035 1040

Asn Gln His Thr Gly Leu Ser Gln Asp Lys His Tyr Gly Arg Tyr Ala  
1045 1050 1055

Ala Pro Gly Arg Asn Tyr Gln Leu Ala Leu Glu Met Lys Phe  
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<210> 14

<211> 17

<212> PRT

<213> Moraxella catarrhalis

<400> 14

Asn Gln Ser Lys Lys Ser Lys Lys Ser Lys Gln Val Leu Lys Leu Ser  
1 5 10 15

Ala

<210> 15

<211> 709



<213> Moraxella catarrhalis

Met	Lys	His	Ile	Pro	Leu	Thr	Thr	Leu	Cys	Val	Ala	Ile	Ser	Ala	Val
1				5					10					15	
Leu	Leu	Thr	Ala	Cys	Gly	Gly	Ser	Ser	Gly	Gly	Phe	Asn	Pro	Pro	Ala
			20					25					30		
Ser	Thr	Pro	Ile	Pro	Asn	Ala	Gly	Asn	Ser	Gly	Asn	Ala	Gly	Asn	Ala
		35					40					45			
Gly	Asn	Ala	Gly	Gly	Thr	Gly	Gly	Ala	Asn	Ser	Gly	Ala	Gly	Asn	Ala
	50					55					60				
Gly	Gly	Thr	Gly	Gly	Ala	Asn	Ser	Gly	Ala	Gly	Ser	Ala	Ser	Thr	Pro
65					70					75					80
Glu	Pro	Lys	Tyr	Lys	Asp	Val	Pro	Thr	Asp	Glu	Asn	Lys	Lys	Ala	Glu
				85					90					95	
Val	Ser	Gly	Ile	Gln	Glu	Pro	Ala	Met	Gly	Tyr	Gly	Val	Glu	Leu	Lys
			100					105					110		
Leu	Arg	Asn	Trp	Ile	Pro	Gln	Glu	Gln	Glu	Glu	His	Ala	Lys	Ile	Asn
		115					120					125			
Thr	Asn	Asp	Val	Val	Lys	Leu	Glu	Gly	Asp	Leu	Lys	His	Asn	Pro	Phe
	130					135					140				
Asp	Asn	Ser	Ile	Trp	Gln	Asn	Ile	Lys	Asn	Ser	Lys	Glu	Val	Gln	Thr
145					150					155					160
Val	Tyr	Asn	Gln	Glu	Lys	Gln	Asn	Ile	Glu	Asp	Gln	Ile	Lys	Arg	Glu
				165					170					175	
Asn	Lys	Gln	Arg	Pro	Asp	Lys	Lys	Leu	Asp	Asp	Val	Ala	Leu	Gln	Ala
			180					185					190		
Tyr	Ile	Glu	Lys	Val	Leu	Asp	Asp	Arg	Leu	Thr	Glu	Leu	Ala	Lys	Pro
		195					200					205			
Ile	Tyr	Glu	Lys	Asn	Ile	Asn	Tyr	Ser	His	Asp	Lys	Gln	Asn	Lys	Ala
	210					215					220				
Arg	Thr	Arg	Asp	Leu	Lys	Tyr	Val	Arg	Ser	Gly	Tyr	Ile	Tyr	Arg	Ser
225				230						235					240
Gly	Tyr	Ser	Asn	Ile	Ile	Pro	Lys	Lys	Ile	Ala	Lys	Thr	Gly	Phe	Asp
				245					250					255	
Gly	Ala	Leu	Phe	Tyr	Gln	Gly	Thr	Gln	Thr	Ala	Lys	Gln	Leu	Pro	Val
			260					265					270		
Ser	Gln	Val	Lys	Tyr	Lys	Gly	Thr	Trp	Asp	Phe	Met	Thr	Asp	Ala	Lys
		275					280					285			

Lys Gly Gln Ser Phe Ser Ser Phe Gly Thr Ser Gln Arg Leu Ala Gly  
 290 295 300  
 Asp Arg Tyr Ser Ala Met Ser Tyr His Glu Tyr Pro Ser Leu Leu Thr  
 305 310 315 320  
 Asp Glu Lys Asn Lys Pro Asp Asn Tyr Asn Gly Glu Tyr Gly His Ser  
 325 330 335  
 Ser Glu Phe Thr Val Asp Phe Ser Lys Lys Ser Leu Lys Gly Glu Leu  
 340 345 350  
 Ser Ser Asn Ile Gln Asp Gly His Lys Gly Ser Val Asn Lys Thr Lys  
 355 360 365  
 Arg Tyr Asp Ile Asp Ala Asn Ile Tyr Gly Asn Arg Phe Arg Gly Ser  
 370 375 380  
 Ala Thr Ala Ser Asp Thr Thr Glu Ala Ser Lys Ser Lys His Pro Phe  
 385 390 395 400  
 Thr Ser Asp Ala Lys Asn Ser Leu Glu Gly Gly Phe Tyr Gly Pro Asn  
 405 410 415  
 Ala Glu Glu Leu Ala Gly Lys Phe Leu Thr Asn Asp Asn Lys Leu Phe  
 420 425 430  
 Gly Val Phe Gly Ala Lys Arg Glu Ser Glu Ala Lys Glu Lys Thr Glu  
 435 440 445  
 Ala Ile Leu Asp Ala Tyr Ala Leu Gly Thr Phe Asn Lys Pro Gly Thr  
 450 455 460  
 Thr Asn Pro Ala Phe Thr Ala Asn Ser Lys Lys Glu Leu Asp Asn Phe  
 465 470 475 480  
 Gly Asn Ala Lys Lys Leu Val Leu Gly Ser Thr Val Ile Asp Leu Val  
 485 490 495  
 Pro Thr Gly Ala Thr Lys Asp Val Asn Glu Phe Lys Glu Lys Pro Lys  
 500 505 510  
 Ser Ala Thr Asn Lys Ala Gly Glu Thr Leu Met Val Asn Asp Glu Val  
 515 520 525  
 Ile Val Lys Thr Tyr Gly Tyr Gly Arg Asn Phe Glu Tyr Leu Lys Phe  
 530 535 540  
 Gly Glu Leu Ser Ile Gly Gly Ser His Ser Val Phe Leu Gln Gly Glu  
 545 550 555 560  
 Arg Thr Ala Glu Lys Ala Val Pro Thr Glu Gly Thr Ala Lys Tyr Leu  
 565 570 575  
 Gly Asn Trp Val Gly Tyr Ile Thr Gly Lys Asp Thr Gly Thr Ser Thr  
 580 585 590  
 Gly Lys Ser Phe Asn Glu Ala Gln Asp Ile Ala Asp Phe Asp Ile Asp  
 595 600 605

Phe Glu Arg Lys Ser Val Lys Gly Lys Leu Thr Thr Gln Gly Arg Gln  
610 615 620

Asp Pro Val Phe Asn Ile Thr Gly Gln Ile Ala Gly Asn Gly Trp Thr  
625 630 635 640

Gly Thr Ala Ser Thr Ala Lys Ala Asn Val Gly Gly Tyr Lys Ile Asp  
645 650 655

Ser Ser Ser Thr Gly Lys Ser Ile Val Ile Glu Asn Ala Lys Val Thr  
660 665 670

Gly Gly Phe Tyr Gly Pro Asn Ala Asn Glu Met Gly Gly Ser Phe Thr  
675 680 685

His Asp Thr Asp Asp Ser Lys Ala Ser Val Val Phe Gly Thr Lys Arg  
690 695 700

Gln Glu Glu Val Lys  
705

<210> 16

<211> 689

<212> PRT

<213> Moraxella catarrhalis

<400> 16

Cys Gly Gly Ser Ser Gly Gly Phe Asn Pro Pro Ala Ser Thr Pro Ile  
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Pro Asn Ala Gly Asn Ser Gly Asn Ala Gly Asn Ala Gly Asn Ala Gly  
20 25 30

Gly Thr Gly Gly Ala Asn Ser Gly Ala Gly Asn Ala Gly Gly Thr Gly  
35 40 45

Gly Ala Asn Ser Gly Ala Gly Ser Ala Ser Thr Pro Glu Pro Lys Tyr  
50 55 60

Lys Asp Val Pro Thr Asp Glu Asn Lys Lys Ala Glu Val Ser Gly Ile  
65 70 75 80

Gln Glu Pro Ala Met Gly Tyr Gly Val Glu Leu Lys Leu Arg Asn Trp  
85 90 95

Ile Pro Gln Glu Gln Glu Glu His Ala Lys Ile Asn Thr Asn Asp Val  
100 105 110

Val Lys Leu Glu Gly Asp Leu Lys His Asn Pro Phe Asp Asn Ser Ile  
115 120 125

Trp Gln Asn Ile Lys Asn Ser Lys Glu Val Gln Thr Val Tyr Asn Gln  
130 135 140

Glu Lys Gln Asn Ile Glu Asp Gln Ile Lys Arg Glu Asn Lys Gln Arg  
145 150 155 160

Pro Asp Lys Lys Leu Asp Asp Val Ala Leu Gln Ala Tyr Ile Glu Lys  
 165 170 175  
 Val Leu Asp Asp Arg Leu Thr Glu Leu Ala Lys Pro Ile Tyr Glu Lys  
 180 185 190  
 Asn Ile Asn Tyr Ser His Asp Lys Gln Asn Lys Ala Arg Thr Arg Asp  
 195 200 205  
 Leu Lys Tyr Val Arg Ser Gly Tyr Ile Tyr Arg Ser Gly Tyr Ser Asn  
 210 215 220  
 Ile Ile Pro Lys Lys Ile Ala Lys Thr Gly Phe Asp Gly Ala Leu Phe  
 225 230 235 240  
 Tyr Gln Gly Thr Gln Thr Ala Lys Gln Leu Pro Val Ser Gln Val Lys  
 245 250 255  
 Tyr Lys Gly Thr Trp Asp Phe Met Thr Asp Ala Lys Lys Gly Gln Ser  
 260 265 270  
 Phe Ser Ser Phe Gly Thr Ser Gln Arg Leu Ala Gly Asp Arg Tyr Ser  
 275 280 285  
 Ala Met Ser Tyr His Glu Tyr Pro Ser Leu Leu Thr Asp Glu Lys Asn  
 290 295 300  
 Lys Pro Asp Asn Tyr Asn Gly Glu Tyr Gly His Ser Ser Glu Phe Thr  
 305 310 315 320  
 Val Asp Phe Ser Lys Lys Ser Leu Lys Gly Glu Leu Ser Ser Asn Ile  
 325 330 335  
 Gln Asp Gly His Lys Gly Ser Val Asn Lys Thr Lys Arg Tyr Asp Ile  
 340 345 350  
 Asp Ala Asn Ile Tyr Gly Asn Arg Phe Arg Gly Ser Ala Thr Ala Ser  
 355 360 365  
 Asp Thr Thr Glu Ala Ser Lys Ser Lys His Pro Phe Thr Ser Asp Ala  
 370 375 380  
 Lys Asn Ser Leu Glu Gly Gly Phe Tyr Gly Pro Asn Ala Glu Glu Leu  
 385 390 395 400  
 Ala Gly Lys Phe Leu Thr Asn Asp Asn Lys Leu Phe Gly Val Phe Gly  
 405 410 415  
 Ala Lys Arg Glu Ser Glu Ala Lys Glu Lys Thr Glu Ala Ile Leu Asp  
 420 425 430  
 Ala Tyr Ala Leu Gly Thr Phe Asn Lys Pro Gly Thr Thr Asn Pro Ala  
 435 440 445  
 Phe Thr Ala Asn Ser Lys Lys Glu Leu Asp Asn Phe Gly Asn Ala Lys  
 450 455 460  
 Lys Leu Val Leu Gly Ser Thr Val Ile Asp Leu Val Pro Thr Gly Ala  
 465 470 475 480

Thr Lys Asp Val Asn Glu Phe Lys Glu Lys Pro Lys Ser Ala Thr Asn  
 485 490 495  
 Lys Ala Gly Glu Thr Leu Met Val Asn Asp Glu Val Ile Val Lys Thr  
 500 505 510  
 Tyr Gly Tyr Gly Arg Asn Phe Glu Tyr Leu Lys Phe Gly Glu Leu Ser  
 515 520 525  
 Ile Gly Gly Ser His Ser Val Phe Leu Gln Gly Glu Arg Thr Ala Glu  
 530 535 540  
 Lys Ala Val Pro Thr Glu Gly Thr Ala Lys Tyr Leu Gly Asn Trp Val  
 545 550 555 560  
 Gly Tyr Ile Thr Gly Lys Asp Thr Gly Thr Ser Thr Gly Lys Ser Phe  
 565 570 575  
 Asn Glu Ala Gln Asp Ile Ala Asp Phe Asp Ile Asp Phe Glu Arg Lys  
 580 585 590  
 Ser Val Lys Gly Lys Leu Thr Thr Gln Gly Arg Gln Asp Pro Val Phe  
 595 600 605  
 Asn Ile Thr Gly Gln Ile Ala Gly Asn Gly Trp Thr Gly Thr Ala Ser  
 610 615 620  
 Thr Ala Lys Ala Asn Val Gly Gly Tyr Lys Ile Asp Ser Ser Ser Thr  
 625 630 635 640  
 Gly Lys Ser Ile Val Ile Glu Asn Ala Lys Val Thr Gly Gly Phe Tyr  
 645 650 655  
 Gly Pro Asn Ala Asn Glu Met Gly Gly Ser Phe Thr His Asp Thr Asp  
 660 665 670  
 Asp Ser Lys Ala Ser Val Val Phe Gly Thr Lys Arg Gln Glu Glu Val  
 675 680 685

Lys

<210> 17  
 <211> 7  
 <212> PRT  
 <213> Moraxella catarrhalis

<400> 17  
 Asn Glu Val Thr Gly Leu Gly  
 1 5

<210> 18  
 <211> 7  
 <212> PRT  
 <213> Moraxella catarrhalis

<400> 18  
 Gly Ala Ile Asn Glu Ile Glu  
       1                      5

<210> 19  
 <211> 60  
 <212> DNA  
 <213> Moraxella catarrhalis

<400> 19  
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<210> 20  
 <211> 57  
 <212> DNA  
 <213> Moraxella catarrhalis

<400> 20  
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<210> 21  
 <211> 912  
 <212> PRT  
 <213> Moraxella catarrhalis

<400> 21  
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 Ile Gly Cys Tyr Val Lys Ala Glu Thr Gln Ser Ile Lys Asp Thr Lys  
                       20                      25                      30  
 Glu Ala Ile Ser Ser Glu Val Asp Thr Gln Ser Thr Glu Asp Ser Glu  
                       35                      40                      45  
 Leu Glu Thr Ile Ser Val Thr Ala Glu Lys Ile Arg Asp Arg Lys Asp  
       50                      55                      60  
 Asn Glu Val Thr Gly Leu Gly Lys Ile Ile Lys Thr Ser Glu Ser Ile  
       65                      70                      75                      80  
 Ser Arg Glu Gln Val Leu Asn Ile Arg Asp Leu Thr Arg Tyr Asp Pro  
                       85                      90                      95  
 Gly Ile Ser Val Val Glu Gln Gly Arg Gly Ala Ser Ser Gly Tyr Ser  
                       100                      105                      110  
 Ile Arg Gly Met Asp Arg Asn Arg Val Ala Leu Leu Val Asp Gly Leu  
                       115                      120                      125  
 Pro Gln Thr Gln Ser Tyr Val Val Gln Ser Pro Leu Val Ala Arg Ser  
                       130                      135                      140  
 Gly Tyr Ser Gly Thr Gly Ala Ile Asn Glu Ile Glu Tyr Glu Asn Val  
       145                      150                      155                      160

Lys Ala Val Glu Ile Ser Lys Gly Gly Ser Ser Ser Glu Tyr Gly Asn  
 165 170 175  
 Gly Ala Leu Ala Gly Ser Val Thr Phe Gln Ser Lys Ser Ala Ala Asp  
 180 185 190  
 Ile Leu Glu Gly Asp Lys Ser Trp Gly Ile Gln Thr Lys Asn Ala Tyr  
 195 200 205  
 Ser Ser Lys Asn Lys Gly Phe Thr His Ser Leu Ala Val Ala Gly Lys  
 210 215 220  
 Gln Gly Gly Phe Glu Gly Leu Ala Ile Tyr Thr Gln Arg Asn Ser Ile  
 225 230 235 240  
 Glu Thr Gln Val His Lys Asp Ala Leu Lys Gly Val Gln Ser Tyr Asp  
 245 250 255  
 Arg Leu Ile Ala Thr Thr Asp Lys Ser Ser Gly Tyr Phe Val Ile Gln  
 260 265 270  
 Gly Glu Cys Pro Asn Gly Asp Asp Lys Cys Ala Ala Lys Pro Pro Ala  
 275 280 285  
 Thr Leu Ser Thr Gln Ser Glu Thr Val Ser Val Ser Asp Tyr Thr Gly  
 290 295 300  
 Ala Asn Arg Ile Lys Pro Asn Pro Met Lys Tyr Glu Ser Gln Ser Trp  
 305 310 315 320  
 Phe Leu Arg Gly Gly Tyr His Phe Ser Glu Gln His Tyr Ile Gly Gly  
 325 330 335  
 Ile Phe Glu Phe Thr Gln Gln Lys Phe Asp Ile Arg Asp Met Thr Phe  
 340 345 350  
 Pro Ala Tyr Leu Ser Pro Thr Glu Arg Arg Asp Asp Ser Ser Arg Ser  
 355 360 365  
 Phe Tyr Pro Met Gln Asp His Gly Ala Tyr Gln His Ile Glu Asp Gly  
 370 375 380  
 Arg Gly Val Lys Tyr Ala Ser Gly Leu Tyr Phe Asp Glu His His Arg  
 385 390 395 400  
 Lys Gln Arg Val Gly Ile Glu Tyr Ile Tyr Glu Asn Lys Asn Lys Ala  
 405 410 415  
 Gly Ile Ile Asp Lys Ala Val Leu Ser Ala Asn Gln Gln Asn Ile Ile  
 420 425 430  
 Leu Asp Ser Tyr Met Arg His Thr His Cys Ser Leu Tyr Pro Asn Pro  
 435 440 445  
 Ser Lys Asn Cys Arg Pro Thr Leu Asp Lys Pro Tyr Ser Tyr Tyr Arg  
 450 455 460  
 Ser Asp Arg Asn Val Tyr Lys Glu Lys His Asn Met Leu Gln Leu Asn  
 465 470 475 480

Leu Glu Lys Lys Ile Gln Gln Asn Trp Leu Thr His Gln Ile Val Phe  
 485 490 495  
 Asn Leu Gly Phe Asp Asp Phe Thr Ser Ala Leu Gln His Lys Asp Tyr  
 500 505 510  
 Leu Thr Arg Arg Val Ile Ala Thr Ala Asp Ser Ile Pro Arg Lys Pro  
 515 520 525  
 Gly Glu Thr Gly Lys Pro Arg Asn Gly Leu Gln Ser Gln Pro Tyr Leu  
 530 535 540  
 Tyr Pro Lys Pro Glu Pro Tyr Phe Ala Gly Gln Asp His Cys Asn Tyr  
 545 550 555 560  
 Gln Gly Ser Ser Ser Asn Tyr Arg Asp Cys Lys Val Arg Leu Ile Lys  
 565 570 575  
 Gly Lys Asn Tyr Tyr Phe Ala Ala Arg Asn Asn Met Ala Leu Gly Lys  
 580 585 590  
 Tyr Val Asp Leu Gly Leu Gly Ile Arg Tyr Asp Val Ser Arg Thr Lys  
 595 600 605  
 Ala Asn Glu Ser Thr Ile Ser Val Gly Lys Phe Lys Asn Phe Ser Trp  
 610 615 620  
 Asn Thr Gly Ile Val Ile Lys Pro Thr Glu Trp Leu Asp Leu Ser Tyr  
 625 630 635 640  
 Arg Leu Ser Thr Gly Phe Arg Asn Pro Ser Phe Ser Glu Met Tyr Gly  
 645 650 655  
 Trp Arg Tyr Gly Gly Lys Asn Asp Glu Val Tyr Val Gly Lys Phe Lys  
 660 665 670  
 Pro Glu Thr Ser Arg Asn Gln Glu Phe Gly Leu Ala Leu Lys Gly Asp  
 675 680 685  
 Phe Gly Asn Ile Glu Ile Ser His Phe Ser Asn Ala Tyr Arg Asn Leu  
 690 695 700  
 Ile Ala Phe Ala Glu Glu Leu Ser Lys Asn Gly Thr Gly Lys Gly Asn  
 705 710 715 720  
 Tyr Gly Tyr His Asn Ala Gln Asn Ala Lys Leu Val Gly Val Asn Ile  
 725 730 735  
 Thr Ala Gln Leu Asp Phe Asn Gly Leu Trp Lys Arg Ile Pro Tyr Gly  
 740 745 750  
 Trp Tyr Ala Thr Phe Ala Tyr Asn Gln Val Lys Val Lys Asp Gln Lys  
 755 760 765  
 Ile Asn Ala Gly Leu Ala Ser Val Ser Ser Tyr Leu Phe Asp Ala Ile  
 770 775 780



Gln Pro Ser Arg Tyr Ile Ile Gly Leu Gly Tyr Asp His Pro Ser Asn  
 785 790 795 800  
 Thr Trp Gly Ile Asn Thr Met Phe Thr Gln Ser Lys Ala Lys Ser Gln  
 805 810 815  
 Asn Glu Leu Leu Gly Lys Arg Ala Leu Gly Asn Asn Ser Arg Asp Val  
 820 825 830  
 Lys Ser Thr Arg Lys Leu Thr Arg Ala Trp His Ile Leu Asp Val Ser  
 835 840 845  
 Gly Tyr Tyr Met Ala Asn Lys Asn Ile Met Leu Arg Leu Gly Ile Tyr  
 850 855 860  
 Asn Leu Phe Asn Tyr Arg Tyr Val Thr Trp Glu Ala Val Arg Gln Thr  
 865 870 875 880  
 Ala Gln Gly Ala Val Asn Gln His Gln Asn Val Gly Ser Tyr Thr Arg  
 885 890 895  
 Tyr Ala Ala Ser Gly Arg Asn Tyr Thr Leu Thr Leu Glu Met Lys Phe  
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 <213> Moraxella catarrhalis

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 Met Thr Ala Leu Pro Val Tyr Ala Glu Asn Val Gln Ala Glu Gln Ala  
 20 25 30  
 Gln Glu Lys Gln Leu Asp Thr Ile Gln Val Lys Ala Lys Lys Gln Lys  
 35 40 45  
 Thr Arg Arg Asp Asn Glu Val Thr Gly Leu Gly Lys Leu Val Lys Ser  
 50 55 60  
 Ser Asp Thr Leu Ser Lys Glu Gln Val Leu Asn Ile Arg Asp Leu Thr  
 65 70 75 80  
 Arg Tyr Asp Pro Gly Ile Ala Val Val Glu Gln Gly Arg Gly Ala Ser  
 85 90 95  
 Ser Gly Tyr Ser Ile Arg Gly Met Asp Lys Asn Arg Val Ser Leu Thr  
 100 105 110  
 Val Asp Gly Val Ser Gln Ile Gln Ser Tyr Thr Ala Gln Ala Ala Leu  
 115 120 125

Gly	Gly	Thr	Arg	Thr	Ala	Gly	Ser	Ser	Gly	Ala	Ile	Asn	Glu	Ile	Glu	
	130					135					140					
Tyr	Glu	Asn	Val	Lys	Ala	Val	Glu	Ile	Ser	Lys	Gly	Ser	Asn	Ser	Ser	
145					150					155					160	
Glu	Tyr	Gly	Asn	Gly	Ala	Leu	Ala	Gly	Ser	Val	Ala	Phe	Gln	Thr	Lys	
				165					170					175		
Thr	Ala	Ala	Asp	Ile	Ile	Gly	Glu	Gly	Lys	Gln	Trp	Gly	Ile	Gln	Ser	
			180					185					190			
Lys	Thr	Ala	Tyr	Ser	Gly	Lys	Asp	His	Ala	Leu	Thr	Gln	Ser	Leu	Ala	
		195					200					205				
Leu	Ala	Gly	Arg	Ser	Gly	Gly	Ala	Glu	Ala	Leu	Leu	Ile	Tyr	Thr	Lys	
	210					215					220					
Arg	Arg	Gly	Arg	Glu	Ile	His	Ala	His	Lys	Asp	Ala	Gly	Lys	Gly	Val	
225					230					235					240	
Gln	Ser	Phe	Asn	Arg	Leu	Val	Leu	Asp	Glu	Asp	Lys	Lys	Glu	Gly	Gly	
			245						250					255		
Ser	Gln	Tyr	Arg	Tyr	Phe	Ile	Val	Glu	Glu	Glu	Cys	His	Asn	Gly	Tyr	
			260					265					270			
Ala	Ala	Cys	Lys	Asn	Lys	Leu	Lys	Glu	Asp	Ala	Ser	Val	Lys	Asp	Glu	
		275					280					285				
Arg	Lys	Thr	Val	Ser	Thr	Gln	Asp	Tyr	Thr	Gly	Ser	Asn	Arg	Leu	Leu	
	290					295					300					
Ala	Asn	Pro	Leu	Glu	Tyr	Gly	Ser	Gln	Ser	Trp	Leu	Phe	Arg	Pro	Gly	
305					310					315					320	
Trp	His	Leu	Asp	Asn	Arg	His	Tyr	Val	Gly	Ala	Val	Leu	Glu	Arg	Thr	
				325					330					335		
Gln	Gln	Thr	Phe	Asp	Thr	Arg	Asp	Met	Thr	Val	Pro	Ala	Tyr	Phe	Thr	
			340					345					350			
Ser	Glu	Asp	Tyr	Val	Pro	Gly	Ser	Leu	Lys	Gly	Leu	Gly	Lys	Tyr	Ser	
		355					360					365				
Gly	Asp	Asn	Lys	Ala	Glu	Arg	Leu	Phe	Val	Gln	Gly	Glu	Gly	Ser	Thr	
	370					375					380					
Leu	Gln	Gly	Ile	Gly	Tyr	Gly	Thr	Gly	Val	Phe	Tyr	Asp	Glu	Arg	His	
385					390					395					400	
Thr	Lys	Asn	Arg	Tyr	Gly	Val	Glu	Tyr	Val	Tyr	His	Asn	Ala	Asp	Lys	
				405					410					415		
Asp	Thr	Trp	Ala	Asp	Tyr	Ala	Arg	Leu	Ser	Tyr	Asp	Arg	Gln	Gly	Ile	
			420					425					430			
Asp	Leu	Asp	Asn	Arg	Leu	Gln	Gln	Thr	His	Cys	Ser	His	Asp	Gly	Ser	
		435					440						445			

Asp	Lys	Asn	Cys	Arg	Pro	Asp	Gly	Asn	Lys	Pro	Tyr	Ser	Phe	Tyr	Lys	450	455	460	
Ser	Asp	Arg	Met	Ile	Tyr	Glu	Glu	Ser	Arg	Asn	Leu	Phe	Gln	Ala	Val	465	470	475	480
Phe	Lys	Lys	Ala	Phe	Asp	Thr	Ala	Lys	Ile	Arg	His	Asn	Leu	Ser	Ile	485	490	495	
Asn	Leu	Gly	Tyr	Asp	Arg	Phe	Lys	Ser	Gln	Leu	Ser	His	Ser	Asp	Tyr	500	505	510	
Tyr	Leu	Gln	Asn	Ala	Val	Gln	Ala	Tyr	Asp	Leu	Ile	Thr	Pro	Pro	Lys	515	520	525	
Pro	Pro	Phe	Pro	Asn	Gly	Ser	Lys	Asp	Asn	Pro	Tyr	Arg	Val	Ser	Ile	530	535	540	
Gly	Lys	Thr	Thr	Val	Asn	Thr	Ser	Pro	Ile	Cys	Arg	Phe	Gly	Asn	Asn	545	550	555	560
Thr	Tyr	Thr	Asp	Cys	Thr	Pro	Arg	Asn	Ile	Gly	Gly	Asn	Gly	Tyr	Tyr	565	570	575	
Ala	Ala	Val	Gln	Asp	Asn	Val	Arg	Leu	Gly	Arg	Trp	Ala	Asp	Val	Gly	580	585	590	
Ala	Gly	Ile	Arg	Tyr	Asp	Tyr	Arg	Ser	Thr	His	Ser	Glu	Asp	Lys	Ser	595	600	605	
Val	Ser	Thr	Gly	Thr	His	Arg	Asn	Leu	Ser	Trp	Asn	Ala	Gly	Val	Val	610	615	620	
Leu	Lys	Pro	Phe	Thr	Trp	Met	Asp	Leu	Thr	Tyr	Arg	Ala	Ser	Thr	Gly	625	630	635	640
Phe	Arg	Leu	Pro	Ser	Phe	Ala	Glu	Met	Tyr	Gly	Trp	Arg	Ala	Gly	Glu	645	650	655	
Ser	Leu	Lys	Thr	Leu	Asp	Leu	Lys	Pro	Glu	Lys	Ser	Phe	Asn	Arg	Glu	660	665	670	
Ala	Gly	Ile	Val	Phe	Lys	Gly	Asp	Phe	Gly	Asn	Leu	Glu	Ala	Ser	Tyr	675	680	685	
Phe	Asn	Asn	Ala	Tyr	Arg	Asp	Leu	Ile	Ala	Phe	Gly	Tyr	Glu	Thr	Arg	690	695	700	
Thr	Gln	Asn	Gly	Gln	Thr	Ser	Ala	Ser	Gly	Asp	Pro	Gly	Tyr	Arg	Asn	705	710	715	720
Ala	Gln	Asn	Ala	Arg	Ile	Ala	Gly	Ile	Asn	Ile	Leu	Gly	Lys	Ile	Asp	725	730	735	
Trp	His	Gly	Val	Trp	Gly	Gly	Leu	Pro	Asp	Gly	Leu	Tyr	Ser	Thr	Leu	740	745	750	

Ala Tyr Asn Arg Ile Lys Val Lys Asp Ala Asp Ile Arg Ala Asp Arg  
755 760 765

Thr Phe Val Thr Ser Tyr Leu Phe Asp Ala Val Gln Pro Ser Arg Tyr  
770 775 780

Val Leu Gly Leu Gly Tyr Asp His Pro Asp Gly Ile Trp Gly Ile Asn  
785 790 795 800

Thr Met Phe Thr Tyr Ser Lys Ala Lys Ser Val Asp Glu Leu Leu Gly  
805 810 815

Ser Gln Ala Leu Leu Asn Gly Asn Ala Asn Ala Lys Lys Ala Ala Ser  
820 825 830

Arg Arg Thr Arg Pro Trp Tyr Val Thr Asp Val Ser Gly Tyr Tyr Asn  
835 840 845

Ile Lys Lys His Leu Thr Leu Arg Ala Gly Val Tyr Asn Leu Leu Asn  
850 855 860

Tyr Arg Tyr Val Thr Trp Glu Asn Val Arg Gln Thr Ala Gly Gly Ala  
865 870 875 880

Val Asn Gln His Lys Asn Val Gly Val Tyr Asn Arg Tyr Ala Ala Pro  
885 890 895

Gly Arg Asn Tyr Thr Phe Ser Leu Glu Met Lys Phe  
900 905

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20 25 30

Gln Glu Lys Gln Leu Asp Thr Ile Gln Val Lys Ala Lys Lys Gln Lys  
35 40 45

Thr Arg Arg Asp Asn Glu Val Thr Gly Leu Gly Lys Leu Val Lys Thr  
50 55 60

Ala Asp Thr Leu Ser Lys Glu Gln Val Leu Asp Ile Arg Asp Leu Thr  
65 70 75 80

Arg Tyr Asp Pro Gly Ile Ala Val Val Glu Gln Gly Arg Gly Ala Ser  
85 90 95

Ser Gly Tyr Ser Ile Arg Gly Met Asp Lys Asn Arg Val Ser Leu Thr  
100 105 110

Val	Asp	Gly	Leu	Ala	Gln	Ile	Gln	Ser	Tyr	Thr	Ala	Gln	Ala	Ala	Leu	115	120	125
Gly	Gly	Thr	Arg	Thr	Ala	Gly	Ser	Ser	Gly	Ala	Ile	Asn	Glu	Ile	Glu	130	135	140
Tyr	Glu	Asn	Val	Lys	Ala	Val	Glu	Ile	Ser	Lys	Gly	Ser	Asn	Ser	Val	145	150	155
Glu	Gln	Gly	Ser	Gly	Ala	Leu	Ala	Gly	Ser	Val	Ala	Phe	Gln	Thr	Lys	165	170	175
Thr	Ala	Asp	Asp	Val	Ile	Gly	Glu	Gly	Arg	Gln	Trp	Gly	Ile	Gln	Ser	180	185	190
Lys	Thr	Ala	Tyr	Ser	Gly	Lys	Asn	Arg	Gly	Leu	Thr	Gln	Ser	Ile	Ala	195	200	205
Leu	Ala	Gly	Arg	Ile	Gly	Gly	Ala	Glu	Ala	Leu	Leu	Ile	His	Thr	Gly	210	215	220
Arg	Arg	Ala	Gly	Glu	Ile	Arg	Ala	His	Glu	Asp	Ala	Gly	Arg	Gly	Val	225	230	235
Gln	Ser	Phe	Asn	Arg	Leu	Val	Pro	Val	Glu	Asp	Ser	Ser	Glu	Tyr	Ala	245	250	255
Tyr	Phe	Ile	Val	Glu	Asp	Glu	Cys	Glu	Gly	Lys	Asn	Tyr	Glu	Thr	Cys	260	265	270
Lys	Ser	Lys	Pro	Lys	Lys	Asp	Val	Val	Gly	Lys	Asp	Glu	Arg	Gln	Thr	275	280	285
Val	Ser	Thr	Arg	Asp	Tyr	Thr	Gly	Pro	Asn	Arg	Phe	Leu	Ala	Asp	Pro	290	295	300
Leu	Ser	Tyr	Glu	Ser	Arg	Ser	Trp	Leu	Phe	Arg	Pro	Gly	Phe	Arg	Phe	305	310	315
Glu	Asn	Lys	Arg	His	Tyr	Ile	Gly	Gly	Ile	Leu	Glu	His	Thr	Gln	Gln	325	330	335
Thr	Phe	Asp	Thr	Arg	Asp	Met	Thr	Val	Pro	Ala	Phe	Leu	Thr	Lys	Ala	340	345	350
Val	Phe	Asp	Ala	Asn	Ser	Lys	Gln	Ala	Gly	Ser	Leu	Pro	Gly	Asn	Gly	355	360	365
Lys	Tyr	Ala	Gly	Asn	His	Lys	Tyr	Gly	Gly	Leu	Phe	Thr	Asn	Gly	Glu	370	375	380
Asn	Gly	Ala	Leu	Val	Gly	Ala	Glu	Tyr	Gly	Thr	Gly	Val	Phe	Tyr	Asp	385	390	395
Glu	Thr	His	Thr	Lys	Ser	Arg	Tyr	Gly	Leu	Glu	Tyr	Val	Tyr	Thr	Asn	405	410	415
Ala	Asp	Lys	Asp	Thr	Trp	Ala	Asp	Tyr	Ala	Arg	Leu	Ser	Tyr	Asp	Arg	420	425	430

Gln Gly Ile Gly Leu Asp Asn His Phe Gln Gln Thr His Cys Ser Ala  
 435 440 445  
 Asp Gly Ser Asp Lys Tyr Cys Arg Pro Ser Ala Asp Lys Pro Phe Ser  
 450 455 460  
 Tyr Tyr Lys Ser Asp Arg Val Ile Tyr Gly Glu Ser His Arg Leu Leu  
 465 470 475 480  
 Gln Ala Ala Phe Lys Lys Ser Phe Asp Thr Ala Lys Ile Arg His Asn  
 485 490 495  
 Leu Ser Val Asn Leu Gly Phe Asp Arg Phe Asp Ser Asn Leu Arg His  
 500 505 510  
 Gln Asp Tyr Tyr Tyr Gln His Ala Asn Arg Ala Tyr Ser Ser Lys Thr  
 515 520 525  
 Pro Pro Lys Thr Ala Asn Pro Asn Gly Asp Lys Ser Lys Pro Tyr Trp  
 530 535 540  
 Val Ser Ile Gly Gly Gly Asn Val Val Thr Gly Gln Ile Cys Leu Phe  
 545 550 555 560  
 Gly Asn Asn Thr Tyr Thr Asp Cys Thr Pro Arg Ser Ile Asn Gly Lys  
 565 570 575  
 Ser Tyr Tyr Ala Ala Val Arg Asp Asn Val Arg Leu Gly Arg Trp Ala  
 580 585 590  
 Asp Val Gly Ala Gly Leu Arg Tyr Asp Tyr Arg Ser Thr His Ser Asp  
 595 600 605  
 Asp Gly Ser Val Ser Thr Gly Thr His Arg Thr Leu Ser Trp Asn Ala  
 610 615 620  
 Gly Ile Val Leu Lys Pro Ala Asp Trp Leu Asp Leu Thr Tyr Arg Thr  
 625 630 635 640  
 Ser Thr Gly Phe Arg Leu Pro Ser Phe Ala Glu Met Tyr Gly Trp Arg  
 645 650 655  
 Ser Gly Val Gln Ser Lys Ala Val Lys Ile Asp Pro Glu Lys Ser Phe  
 660 665 670  
 Asn Lys Glu Ala Gly Ile Val Phe Lys Gly Asp Phe Gly Asn Leu Glu  
 675 680 685  
 Ala Ser Trp Phe Asn Asn Ala Tyr Arg Asp Leu Ile Val Arg Gly Tyr  
 690 695 700  
 Glu Ala Gln Ile Lys Asn Gly Lys Glu Glu Ala Lys Gly Asp Pro Ala  
 705 710 715 720  
 Tyr Leu Asn Ala Gln Ser Ala Arg Ile Thr Gly Ile Asn Ile Leu Gly  
 725 730 735

Lys Ile Asp Trp Asn Gly Val Trp Asp Lys Leu Pro Glu Gly Trp Tyr  
 740 745 750  
 Ser Thr Phe Ala Tyr Asn Arg Val His Val Arg Asp Ile Lys Lys Arg  
 755 760 765  
 Ala Asp Arg Thr Asp Ile Gln Ser His Leu Phe Asp Ala Ile Gln Pro  
 770 775 780  
 Ser Arg Tyr Val Val Gly Leu Gly Tyr Asp Gln Pro Glu Gly Lys Trp  
 785 790 795 800  
 Gly Val Asn Gly Met Leu Thr Tyr Ser Lys Ala Lys Glu Ile Thr Glu  
 805 810 815  
 Leu Leu Gly Ser Arg Ala Leu Leu Asn Gly Asn Ser Arg Asn Thr Lys  
 820 825 830  
 Ala Thr Ala Arg Arg Thr Arg Pro Trp Tyr Ile Val Asp Val Ser Gly  
 835 840 845  
 Tyr Tyr Thr Ile Lys Lys His Phe Thr Leu Arg Ala Gly Val Tyr Asn  
 850 855 860  
 Leu Leu Asn Tyr Arg Tyr Val Thr Trp Glu Asn Val Arg Gln Thr Ala  
 865 870 875 880  
 Gly Gly Ala Val Asn Gln His Lys Asn Val Gly Val Tyr Asn Arg Tyr  
 885 890 895  
 Ala Ala Pro Gly Arg Asn Tyr Thr Phe Ser Leu Glu Met Lys Phe  
 900 905 910

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 Met Thr Ala Leu Pro Ala Tyr Ala Glu Asn Val Gln Ala Gly Gln Ala  
 20 25 30  
 Gln Glu Lys Gln Leu Asp Thr Ile Gln Val Lys Ala Lys Lys Gln Lys  
 35 40 45  
 Thr Arg Arg Asp Asn Glu Val Thr Gly Leu Gly Lys Leu Val Lys Thr  
 50 55 60  
 Ala Asp Thr Leu Ser Lys Glu Gln Val Leu Asp Ile Arg Asp Leu Thr  
 65 70 75 80  
 Arg Tyr Asp Pro Gly Ile Ala Val Val Glu Gln Gly Arg Gly Ala Ser  
 85 90 95

Ser	Gly	Tyr	Ser	Ile	Arg	Gly	Met	Asp	Lys	Asn	Arg	Val	Ser	Leu	Thr	100	105	110
Val	Asp	Gly	Leu	Ala	Gln	Ile	Gln	Ser	Tyr	Thr	Ala	Gln	Ala	Ala	Leu	115	120	125
Gly	Gly	Thr	Arg	Thr	Ala	Gly	Ser	Ser	Gly	Ala	Ile	Asn	Glu	Ile	Glu	130	135	140
Tyr	Glu	Asn	Val	Lys	Ala	Val	Glu	Ile	Ser	Lys	Gly	Ser	Asn	Ser	Val	145	150	155
Glu	Gln	Gly	Ser	Gly	Ala	Leu	Ala	Gly	Ser	Val	Ala	Phe	Gln	Thr	Lys	165	170	175
Thr	Ala	Asp	Asp	Val	Ile	Gly	Glu	Gly	Arg	Gln	Trp	Gly	Ile	Gln	Ser	180	185	190
Lys	Thr	Ala	Tyr	Ser	Gly	Lys	Asn	Arg	Gly	Leu	Thr	Gln	Ser	Leu	Ala	195	200	205
Leu	Ala	Gly	Arg	Ile	Gly	Gly	Ala	Glu	Ala	Leu	Leu	Ile	Arg	Thr	Gly	210	215	220
Arg	His	Ala	Gly	Glu	Ile	Arg	Ala	His	Glu	Ala	Ala	Gly	Arg	Gly	Val	225	230	235
Gln	Ser	Phe	Asn	Arg	Leu	Ala	Pro	Val	Asp	Asp	Gly	Ser	Lys	Tyr	Ala	245	250	255
Tyr	Phe	Ile	Val	Glu	Glu	Glu	Cys	Lys	Asn	Gly	Gly	His	Glu	Lys	Cys	260	265	270
Lys	Ala	Asn	Pro	Pro	Lys	Asp	Val	Val	Gly	Glu	Asp	Lys	Arg	Gln	Thr	275	280	285
Val	Ser	Thr	Arg	Asp	Tyr	Thr	Gly	Pro	Asn	Arg	Phe	Leu	Ala	Asp	Pro	290	295	300
Leu	Ser	Tyr	Glu	Ser	Arg	Ser	Trp	Leu	Phe	Arg	Pro	Gly	Phe	Arg	Phe	305	310	315
Glu	Asn	Lys	Arg	His	Tyr	Ile	Gly	Gly	Ile	Leu	Glu	Arg	Thr	Gln	Gln	325	330	335
Thr	Phe	Asp	Thr	Arg	Asp	Met	Thr	Val	Pro	Ala	Phe	Leu	Thr	Lys	Ala	340	345	350
Val	Phe	Asp	Ala	Asn	Gln	Lys	Gln	Ala	Gly	Ser	Leu	Arg	Gly	Asn	Gly	355	360	365
Lys	Tyr	Ala	Gly	Asn	His	Lys	Tyr	Gly	Gly	Leu	Phe	Thr	Ser	Gly	Glu	370	375	380
Asn	Asn	Ala	Pro	Val	Gly	Ala	Glu	Tyr	Gly	Thr	Gly	Val	Phe	Tyr	Asp	385	390	395
Glu	Thr	His	Thr	Lys	Ser	Arg	Tyr	Gly	Leu	Glu	Tyr	Val	Tyr	Thr	Asn	405	410	415



Ala Asp Lys Asp Thr Trp Ala Asp Tyr Ala Arg Leu Ser Tyr Asp Arg  
 420 425 430  
 Gln Gly Ile Gly Leu Asp Asn His Phe Gln Gln Thr His Cys Ser Ala  
 435 440 445  
 Asp Gly Ser Asp Lys Tyr Cys Arg Pro Ser Ala Asp Lys Pro Phe Ser  
 450 455 460  
 Tyr Tyr Lys Ser Asp Arg Val Ile Tyr Gly Glu Ser His Lys Leu Leu  
 465 470 475 480  
 Gln Ala Ala Phe Lys Lys Ser Phe Asp Thr Ala Lys Ile Arg His Asn  
 485 490 495  
 Leu Ser Val Asn Leu Gly Tyr Asp Arg Phe Gly Ser Asn Leu Arg His  
 500 505 510  
 Gln Asp Tyr Tyr Tyr Gln Ser Ala Asn Arg Ala Tyr Ser Ser Lys Thr  
 515 520 525  
 Pro Pro Gln Asn Asn Gly Lys Lys Thr Ser Pro Asn Gly Arg Glu Lys  
 530 535 540  
 Asn Pro Tyr Trp Val Ser Ile Gly Arg Gly Asn Val Val Thr Arg Gln  
 545 550 555 560  
 Ile Cys Leu Phe Gly Asn Asn Thr Tyr Thr Asp Cys Thr Pro Arg Ser  
 565 570 575  
 Ile Asn Gly Lys Ser Tyr Tyr Ala Ala Val Arg Asp Asn Val Arg Leu  
 580 585 590  
 Gly Arg Trp Ala Asp Val Gly Ala Gly Leu Arg Tyr Asp Tyr Arg Ser  
 595 600 605  
 Thr His Ser Asp Asp Gly Ser Val Ser Thr Gly Thr His Arg Thr Leu  
 610 615 620  
 Ser Trp Asn Ala Gly Ile Val Leu Lys Pro Ala Asp Trp Leu Asp Leu  
 625 630 635 640  
 Thr Tyr Arg Thr Ser Thr Gly Phe Arg Leu Pro Ser Phe Ala Glu Met  
 645 650 655  
 Tyr Gly Trp Arg Ser Gly Asp Lys Ile Lys Ala Val Lys Ile Asp Pro  
 660 665 670  
 Glu Lys Ser Phe Asn Lys Glu Ala Gly Ile Val Phe Lys Gly Asp Phe  
 675 680 685  
 Gly Asn Leu Glu Ala Ser Trp Phe Asn Asn Ala Tyr Arg Asp Leu Ile  
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 Val Arg Gly Tyr Glu Ala Gln Ile Lys Asp Gly Lys Glu Gln Val Lys  
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 Gly Asn Pro Ala Tyr Leu Asn Ala Gln Ser Ala Arg Ile Thr Gly Ile

<400> 25																
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Ala	Cys	Ser	Gly	Gly	Gly	Ser	Phe	Asp	Val	Asp	Asn	Val	Ser	Asn	Thr	
			20					25					30			
Pro	Ser	Ser	Lys	Pro	Arg	Tyr	Gln	Asp	Asp	Thr	Ser	Asn	Gln	Arg	Lys	
		35					40					45				
Lys	Ser	Asn	Leu	Lys	Lys	Leu	Phe	Ile	Ser	Leu	Gly	Tyr	Gly	Met	Lys	
	50					55					60					
Leu	Val	Ala	Gln	Asn	Leu	Arg	Gly	Asn	Lys	Glu	Pro	Ser	Phe	Leu	Asn	
65					70					75					80	

Glu	Asp	Asp	Tyr	Ile	Ser	Tyr	Phe	Ser	Ser	Leu	Ser	Thr	Ile	Glu	Lys			
				85						90						95		
Asp	Val	Lys	Asp	Asn	Lys	Asn	Gly	Ala	Asp	Leu	Ile	Gly	Ser	Ile	Asp			
			100						105							110		
Glu	Pro	Ser	Thr	Thr	Asn	Pro	Pro	Glu	Lys	His	His	Gly	Gln	Lys	Tyr			
		115						120								125		
Val	Tyr	Ser	Gly	Leu	Tyr	Tyr	Thr	Pro	Ser	Trp	Ser	Leu	Asn	Asp	Ser			
		130						135								140		
Lys	Asn	Lys	Phe	Tyr	Leu	Gly	Tyr	Tyr	Gly	Tyr	Ala	Phe	Tyr	Tyr	Gly			
145							150								155		160	
Asn	Lys	Thr	Ala	Thr	Asn	Leu	Pro	Val	Asn	Gly	Val	Val	Lys	Tyr	Lys			
			165						170							175		
Gly	Thr	Trp	Asp	Phe	Ile	Thr	Ala	Thr	Lys	Asn	Gly	Lys	Arg	Tyr	Pro			
			180						185							190		
Leu	Leu	Ser	Asn	Gly	Gly	Ser	His	Ala	Tyr	Tyr	Arg	Arg	Ser	Ala	Ile			
		195						200								205		
Pro	Glu	Asp	Ile	Asp	Leu	Glu	Asn	Asp	Ser	Lys	Asn	Gly	Asp	Ile	Gly			
		210						215								220		
Leu	Ile	Ser	Glu	Phe	Ser	Ala	Asp	Phe	Gly	Thr	Lys	Lys	Leu	Thr	Gly			
225							230								235		240	
Gln	Leu	Ser	Tyr	Thr	Lys	Arg	Lys	Thr	Asn	Asn	Gln	Pro	Tyr	Glu	Lys			
			245						250							255		
Lys	Lys	Leu	Tyr	Asp	Ile	Asp	Ala	Asp	Ile	Tyr	Ser	Asn	Arg	Phe	Arg			
		260						265								270		
Gly	Thr	Val	Lys	Pro	Thr	Glu	Lys	Asp	Ser	Glu	Glu	His	Pro	Phe	Thr			
		275						280								285		
Ser	Glu	Gly	Thr	Leu	Glu	Gly	Gly	Phe	Tyr	Pro	Asn	Ala	Glu	Glu	Leu			
		290						295								300		
Gly	Gly	Lys	Phe	Leu	Ala	Thr	Asp	Asn	Arg	Val	Phe	Gly	Val	Phe	Ser			
305							310								315		320	
Ala	Lys	Glu	Thr	Glu	Glu	Thr	Lys	Lys	Glu	Ala	Leu	Ser	Lys	Glu	Thr			
			325						330							335		
Leu	Ile	Asp	Gly	Lys	Leu	Ile	Thr	Phe	Ser	Thr	Lys	Lys	Thr	Asp	Ala			
			340						345							350		
Lys	Thr	Asn	Ala	Thr	Thr	Ser	Thr	Ala	Ala	Asn	Thr	Thr	Thr	Asp	Thr			
		355						360								365		
Thr	Ala	Asn	Thr	Ile	Thr	Asp	Glu	Lys	Asn	Phe	Lys	Thr	Glu	Asp	Ile			
		370						375								380		

Ser Ser Phe Gly Glu Ala Asp Tyr Leu Leu Ile Asp Lys Tyr Pro Ile  
 385 390 395 400  
 Pro Leu Leu Pro Asp Lys Asn Thr Asn Asp Phe Ile Ser Ser Lys His  
 405 410 415  
 His Thr Val Gly Asn Lys Arg Tyr Lys Val Glu Ala Cys Cys Ser Asn  
 420 425 430  
 Leu Tyr Val Lys Phe Gly Met Tyr Tyr Glu Asp Pro Leu Lys Glu Lys  
 435 440 445  
 Glu Thr Glu Thr Glu Thr Glu Thr Glu Lys Asp Lys Glu Lys Glu Lys  
 450 455 460  
 Glu Lys Asp Lys Asp Lys Glu Lys Gln Thr Ala Ala Thr Thr Asn Thr  
 465 470 475 480  
 Tyr Tyr Gln Phe Leu Leu Gly His Arg Thr Pro Lys Asp Asp Ile Pro  
 485 490 495  
 Lys Thr Gly Ser Ala Lys Tyr His Gly Ser Trp Phe Gly Tyr Ile Thr  
 500 505 510  
 Asp Gly Lys Thr Ser Tyr Ser Pro Ser Gly Asp Lys Lys Arg Asp Lys  
 515 520 525  
 Asn Ala Val Ala Glu Phe Asn Val Asp Phe Ala Glu Lys Lys Leu Thr  
 530 535 540  
 Gly Glu Leu Lys Arg His Asp Thr Gly Asn Pro Val Phe Ser Ile Glu  
 545 550 555 560  
 Ala Asn Phe Asn Asn Ser Ser Asn Ala Phe Thr Gly Thr Ala Thr Ala  
 565 570 575  
 Thr Asn Phe Val Ile Asp Gly Lys Asn Ser Gln Asn Lys Asn Thr Pro  
 580 585 590  
 Ile Asn Ile Thr Thr Lys Val Asn Gly Ala Phe Tyr Gly Pro Lys Ala  
 595 600 605  
 Ser Glu Leu Gly Gly Tyr Phe Thr Tyr Asn Gly Asn Ser Thr Ala Thr  
 610 615 620  
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Lys

<210> 26  
 <211> 601  
 <212> PRT  
 <213> Moraxella catarrhalis

&lt;400&gt; 26

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			20					25					30		
Val	Glu	Thr	Val	Gln	Asp	Met	His	Ser	Lys	Pro	Lys	Tyr	Glu	Asp	Glu
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Lys	Ser	Gln	Pro	Glu	Ser	Gln	Gln	Asp	Val	Ser	Glu	Asn	Ser	Gly	Ala
	50					55					60				
Ala	Tyr	Gly	Phe	Ala	Val	Lys	Leu	Pro	Arg	Arg	Asn	Ala	His	Phe	Asn
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Pro	Lys	Tyr	Lys	Glu	Lys	His	Lys	Pro	Leu	Gly	Ser	Met	Asp	Trp	Lys
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Lys	Leu	Gln	Arg	Gly	Glu	Pro	Asn	Ser	Phe	Ser	Glu	Arg	Asp	Glu	Leu
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Gly	Tyr	Val	Tyr	Leu	Asn	Lys	Asn	Asn	Ile	Asp	Ile	Lys	Asn	Asn	Ile
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Val	Leu	Phe	Gly	Pro	Asp	Gly	Tyr	Leu	Tyr	Tyr	Lys	Gly	Lys	Glu	Pro
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Ser	Lys	Glu	Leu	Pro	Ser	Glu	Lys	Ile	Thr	Tyr	Lys	Gly	Thr	Trp	Asp
			180					185					190		
Tyr	Val	Thr	Asp	Ala	Met	Glu	Lys	Gln	Arg	Phe	Glu	Gly	Leu	Gly	Ser
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Ala	Ala	Gly	Gly	Asp	Lys	Ser	Gly	Ala	Leu	Ser	Ala	Leu	Glu	Glu	Gly
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Val	Leu	Arg	Asn	Gln	Ala	Glu	Ala	Ser	Ser	Gly	His	Thr	Asp	Phe	Gly
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Ser His Pro Phe Ile Ser Asp Ser Asp Ser Leu Glu Gly Gly Phe Tyr  
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 Ile Thr Gly Glu Glu Phe Lys Lys Glu Gln Ile Asp Ser Phe Gly Asp  
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 485 490 495  
 Asp Phe Ser Thr Lys Lys Ile Ser Gly Thr Leu Thr Ala Lys Asp Arg  
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&lt;212&gt; PRT

<400> 27

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Thr Asp Gly Asp Ser Asp Ile Tyr Ser Ser Pro Tyr Leu Thr Pro Ser  
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Gln Ala Thr Gly His Glu Asn Phe Gln Tyr Val Tyr Ser Gly Trp Phe  
145 150 155 160

Ser Gly Asp Asp Gly Tyr Ile Phe Tyr His Gly Glu Lys Pro Ser Arg  
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Val Thr Asp Thr Lys Lys Gly Gln Asp Phe Arg Glu Ile Ile Gln Pro  
210 215 220

Glu Glu Tyr Ser Asn Lys Asn Glu Ser Thr Leu Lys Asp Asp His Glu  
245 250 255

Leu Thr Gly Lys Leu Ile Arg Asn Asn Ala Ser Leu Asn Asn Asn Thr  
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Asn	Asn	Asp	Lys	His	Thr	Thr	Gln	Tyr	Tyr	Ser	Leu	Asp	Ala	Gln	Ile
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Thr	Gly	Gly	Asn	Pro	Phe	Asn	Gly	Thr	Ala	Thr	Ala	Thr	Asp	Lys	Lys
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Asp	Lys	Leu	Glu	Asn	Gly	Ala	Ala	Ala	Ser	Gly	Ser	Gly	Ala	Ala	Ala
	370					375					380				
Ser	Gly	Gly	Ala	Ala	Gly	Thr	Ser	Ser	Glu	Asn	Ser	Lys	Leu	Thr	Thr
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Val	Leu	Asp	Ala	Val	Glu	Leu	Thr	Leu	Asn	Asp	Lys	Lys	Ile	Lys	Asn
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Leu	Asp	Asn	Phe	Ser	Asn	Ala	Ala	Gln	Leu	Val	Val	Asp	Gly	Ile	Met
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Ile	Pro	Leu	Leu	Pro	Lys	Asp	Ser	Glu	Ser	Gly	Asn	Thr	Gln	Ala	Asp
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Lys	Gly	Lys	Asn	Gly	Gly	Thr	Glu	Phe	Thr	Arg	Lys	Phe	Glu	His	Thr
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Pro	Glu	Ser	Asp	Lys	Lys	Asp	Ala	Gln	Ala	Gly	Thr	Gln	Thr	Asn	Gly
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Ala	Gln	Thr	Ala	Ser	Asn	Thr	Ala	Gly	Asp	Thr	Asn	Gly	Lys	Thr	Lys
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Phe	Leu	Gln	Gly	Glu	Arg	Thr	Asp	Glu	Lys	Glu	Ile	Pro	Thr	Asp	Gln
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Ser	Trp	Ser	Gly	Asn	Ala	Ser	Asp	Lys	Glu	Gly	Gly	Asn	Arg	Ala	Asp
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			595				600					605			



Glu Asn Arg Thr Ala Gln Thr Phe Thr Ile Glu Gly Met Ile Gln Gly  
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 625 630 635 640  
 Asp Gln Lys Asn Thr Thr Arg Thr Pro Lys Ala Tyr Ile Thr Asp Ala  
 645 650 655  
 Lys Val Lys Gly Gly Phe Tyr Gly Pro Lys Ala Glu Glu Leu Gly Gly  
 660 665 670  
 Trp Phe Ala Tyr Pro Gly Asp Lys Gln Thr Glu Lys Ala Thr Ala Thr  
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 Lys Arg Gln Gln Pro Val Gln  
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 Ser Glu Lys Pro Gln Ala Gln Lys Asp Gln Gly Gly Tyr Gly Phe Ala  
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 Met Arg Phe Lys Arg Arg Asn Trp His Pro Ser Ala Asn Pro Lys Glu  
 65 70 75 80  
 Asp Glu Val Lys Leu Lys Asn Asp Asp Trp Glu Ala Thr Gly Leu Pro  
 85 90 95  
 Thr Glu Pro Lys Lys Leu Pro Leu Lys Gln Gln Ser Val Ile Ser Glu  
 100 105 110  
 Val Glu Thr Asn Gly Asn Ser Lys Met Tyr Thr Ser Pro Tyr Leu Ser  
 115 120 125  
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 130 135 140  
 Glu Val Thr Asp Tyr Lys Lys Phe Lys Tyr Val Tyr Ser Gly Trp Phe  
 145 150 155 160

Tyr Lys His Ala Lys Ser Glu Val Lys Asn Glu Asn Gly Leu Val Ser  
 165 170 175  
 Ala Lys Arg Gly Asp Asp Gly Tyr Ile Phe Tyr His Gly Asp Lys Pro  
 180 185 190  
 Ser Arg Gln Leu Pro Ala Ser Glu Ala Val Thr Tyr Lys Gly Val Trp  
 195 200 205  
 His Phe Val Thr Asp Thr Lys Gln Gly Gln Lys Phe Asn Asp Ile Leu  
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 Glu Thr Ser Lys Gly Gln Gly Asp Lys Tyr Ser Gly Phe Ser Gly Asp  
 225 230 235 240  
 Glu Gly Glu Thr Thr Ser Asn Arg Thr Asp Ser Asn Leu Asn Asp Lys  
 245 250 255  
 His Glu Gly Tyr Gly Phe Thr Ser Asn Phe Lys Val Asp Phe Asn Asn  
 260 265 270  
 Lys Lys Leu Thr Gly Lys Leu Ile Arg Asn Asn Lys Val Ile Asn Thr  
 275 280 285  
 Ala Ala Ser Asp Gly Tyr Thr Thr Glu Tyr Tyr Ser Leu Asp Ala Thr  
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 Leu Arg Gly Asn Arg Phe Ser Gly Lys Ala Ile Ala Thr Asp Lys Pro  
 305 310 315 320  
 Asn Thr Gly Gly Thr Lys Leu His Pro Phe Val Phe Asp Ser Ser Ser  
 325 330 335  
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 340 345 350  
 Phe Leu Ser Asp Asp Gly Lys Val Ala Val Val Gly Ser Ala Lys Thr  
 355 360 365  
 Lys Asp Ser Thr Ala Asn Gly Asn Ala Pro Ala Ala Ser Ser Gly Pro  
 370 375 380  
 Gly Ala Ala Thr Met Pro Ser Glu Thr Arg Leu Thr Thr Val Leu Asp  
 385 390 395 400  
 Ala Val Glu Leu Thr Pro Asp Gly Lys Glu Ile Lys Asn Leu Asp Asn  
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 Phe Ser Asn Ala Thr Arg Leu Val Val Asp Gly Ile Met Ile Pro Leu  
 420 425 430  
 Leu Pro Thr Glu Ser Gly Asn Gly Gln Ala Asp Lys Gly Lys Asn Gly  
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 Lys Asp Thr Lys Ala Gln Thr Gly Ala Gly Gly Met Gln Thr Ala Ser  
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Gly Thr Ala Thr Val Asn Gly Gly Gln Val Gly Thr Lys Thr Tyr Lys  
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 Gly Glu Arg Thr Asp Glu Asn Lys Ile Pro Gln Glu Gln Gly Ile Val  
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 Tyr Arg Gly Phe Trp Tyr Gly Arg Ile Ala Asn Gly Thr Ser Trp Ser  
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 Gly Lys Ala Ser Asn Ala Thr Asp Gly Asn Arg Ala Lys Phe Thr Val  
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 Ser Glu Ala Thr Phe Thr Ile Asp Ala Met Ile Glu Gly Asn Gly Phe  
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 Gly Gly Phe Tyr Gly Pro Asn Ala Glu Glu Leu Gly Gly Trp Phe Ala  
                             660                            665                            670  
 Tyr Pro Gly Asn Glu Gln Thr Lys Asn Ala Thr Val Glu Ser Gly Asn  
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 <212> DNA  
 <213> Moraxella catarrhalis

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 aggtcgtggg gcaagctcag gctattctat tcgtgggtatg gataaaaatc gtgtggcggt 180  
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<210> 30  
 <211> 7  
 <212> PRT  
 <213> Moraxella catarrhalis

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<210> 31  
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 <213> Moraxella catarrhalis

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<212> DNA

<213> Moraxella catarrhalis

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<212> DNA

<213> Moraxella catarrhalis

<400> 38

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<210> 39

<211> 105

<212> DNA

<213> Moraxella catarrhalis

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<212> DNA

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<210> 41

<211> 115

<212> DNA

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<211> 40

<212> DNA

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<400> 42

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<211> 30

<212> DNA

<213> Moraxella catarrhalis

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<211> 2287

<212> DNA

<213> Moraxella catarrhalis

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<210> 46

<211> 2145

<212> DNA

<213> Moraxella catarrhalis

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<211> 713

<212> PRT

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Leu	Leu	Thr	Ala	Cys	Gly	Gly	Ser	Gly	Gly	Ser	Asn	Pro	Pro	Ala	Pro	20	25	30	
Thr	Pro	Ile	Pro	Asn	Ala	Ser	Gly	Ser	Gly	Asn	Thr	Gly	Asn	Thr	Gly	35	40	45	
Asn	Ala	Gly	Gly	Thr	Asp	Asn	Thr	Ala	Asn	Ala	Gly	Asn	Thr	Gly	Gly	50	55	60	
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Asp	Gln	Gln	Asp	Thr	Pro	Leu	Asp	Ala	Lys	Asn	Ile	Ile	Thr	Leu	Asp	115	120	125	
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Glu	Ala	Asp	Lys	Asn	Ala	Ile	Gly	Glu	Arg	Ile	Lys	Arg	Glu	Asn	Glu	165	170	175	
Gln	Asn	Lys	Lys	Ile	Ser	Asp	Glu	Glu	Leu	Ala	Lys	Lys	Ile	Lys	Glu	180	185	190	
Asn	Val	Arg	Lys	Ser	Pro	Glu	Phe	Gln	Gln	Val	Leu	Ser	Ser	Ile	Lys	195	200	205	
Ala	Lys	Thr	Phe	His	Ser	Asn	Asp	Lys	Thr	Thr	Lys	Ala	Thr	Thr	Arg	210	215	220	
Asp	Leu	Lys	Tyr	Val	Asp	Tyr	Gly	Tyr	Tyr	Leu	Val	Asn	Asp	Ala	Asn	225	230	235	240
Tyr	Leu	Thr	Val	Lys	Thr	Asp	Lys	Pro	Lys	Leu	Trp	Asn	Ser	Gly	Pro	245	250	255	
Val	Gly	Gly	Val	Phe	Tyr	Asn	Gly	Ser	Thr	Thr	Ala	Lys	Glu	Leu	Pro	260	265	270	
Thr	Gln	Asp	Ala	Val	Lys	Tyr	Lys	Gly	His	Trp	Asp	Phe	Met	Thr	Asp	275	280	285	
Val	Ala	Lys	Lys	Arg	Asn	Arg	Phe	Ser	Glu	Val	Lys	Glu	Thr	Tyr	Gln	290	295	300	



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 325 330 335  
 His Ser Ser Glu Phe Thr Val Asn Phe Lys Glu Lys Lys Leu Thr Gly  
 340 345 350  
 Glu Leu Phe Ser Asn Leu Gln Asp Ser His Lys Gln Lys Val Thr Lys  
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 Thr Lys Arg Tyr Asp Ile Lys Ala Asp Ile His Gly Asn Arg Phe Arg  
 370 375 380  
 Gly Ser Ala Thr Ala Thr Asp Lys Ala Glu Asp Ser Lys Ser Lys His  
 385 390 395 400  
 Pro Phe Thr Ser His Ala Lys Asp Lys Leu Glu Gly Gly Phe Tyr Gly  
 405 410 415  
 Pro Lys Gly Glu Glu Leu Ala Gly Lys Phe Leu Thr Asp Asp Asn Lys  
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 Val Pro Thr Asp Ala Thr Lys Asp Val Asn Glu Phe Lys Glu Lys Pro  
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 Thr Ala Thr Thr Gly Glu Lys Ala Val Pro Thr Thr Gly Lys Ala Lys  
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 Tyr Leu Gly Asn Trp Val Gly Tyr Ile Thr Gly Ala Asp Ser Ser Lys  
 580 585 590  
 Gly Ser Thr Asp Gly Lys Gly Phe Thr Asp Ala Lys Asp Ile Ala Asp  
 595 600 605

Phe Asp Ile Asp Phe Glu Lys Lys Ser Val Asn Gly Lys Leu Thr Thr  
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Lys Asp Arg Gln Asp Pro Val Phe Asn Ile Thr Gly Glu Ile Ala Gly  
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Asn Gly Trp Thr Gly Lys Ala Ser Thr Ala Glu Ala Asn Ala Gly Gly  
 645 650 655

Tyr Lys Ile Asp Ser Ser Ser Thr Gly Lys Ser Ile Val Ile Lys Asp  
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*a!*  
*Concluded*